

**Woods Hole  
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**A Compilation of the Rare Earth Element Composition of  
Rivers, Estuaries and the Oceans**

by

Edward R. Sholkovitz

November 1996

**Technical Report**

Funding was provided by the Woods Hole Oceanographic Institution.

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**Edward R. Sholkovitz**

**Woods Hole Oceanographic Institution  
Woods Hole, Massachusetts 02543**

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A handwritten signature in dark ink, appearing to read "Michael Bacon", is written over a horizontal line.

**Michael Bacon, Chair**

**Department of Marine Chemistry and Geochemistry**

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## Abstract

This technical report serves as an appendix to a recent article by Byrne and Sholkovitz (1996) in the Handbook on the Physics and Chemistry of Rare Earths (vol. 23, chapter 158, pg. 497-592) edited by K. A. Gschneidner Jr. and L. Eyring and published by Elsevier Science. This article, *Marine Chemistry and Geochemistry of the Lanthanides*, discusses the physical chemistry of the lanthanides in natural waters, describes the major features of the lanthanides in rivers, estuaries and oceans and discusses the chemical and biogeochemical processes controlling the speciation and distribution of the lanthanides in the ocean.

The article by Byrne and Sholkovitz (1996) refers to a large set of published and unpublished data on the rare earth (RE) composition of rivers, estuaries, seawater, marine pore waters and marine hydrothermal waters. In order to conserve space in the Handbook article, a compilation of concentration data for natural waters will be presented in this report. Publications through 1995 are cited.

## Introduction

This technical report serves as an appendix to a recent article by Byrne and Sholkovitz (1996) in the Handbook on the Physics and Chemistry of Rare Earths (vol. 23, chapter 158, pg. 497-592) edited by K. A. Gschneidner Jr. and L. Eyring and published by Elsevier Science. This article, *Marine Chemistry and Geochemistry of the Lanthanides*, discusses the physical chemistry of the lanthanides in natural waters, describes the major features of the lanthanides in rivers, estuaries and oceans and discusses the chemical and biogeochemical processes controlling the speciation and distribution of the lanthanides in the ocean. The focus of this article is on rivers, estuaries and the oceans; this includes a discussion of pore waters and hydrothermal waters. The extensive literature on the lanthanide geochemistry of marine sediments is not discussed.

The article by Byrne and Sholkovitz (1996) refers to a large set of published and unpublished data on the rare earth (RE) composition of rivers, estuaries, seawater, pore waters and hydrothermal waters. In order to conserve space in the Handbook, this compilation of data will be presented in this report. Each section of this report corresponds to a section number in the Handbook article of Byrne and Sholkovitz (1996). The identification of tables in both the Handbook article and in this technical report will be the same, that is tables A1 through A14. These tables appear in the same order as they are referred to in the Handbook chapter. After going to press with Byrne and Sholkovitz (1996), it was decided to delete Table A4 from this technical report. Table A4 was meant to sort and to list the various studies of RE in the published literature by ocean basin (e.g., Atlantic, Pacific, Indian). The reference list in this technical report is formatted to cover this type of bibliography.

Most of the data in tables A1-A14 refer to either the dissolved concentrations of rare earths or to the RE concentration of unfiltered seawater. In a few specific cases, data has been reported for the suspended particulate matter. Each table will indicate the type of filtration used to yield the dissolved fraction for RE analyses; most samples refer to filtrates passing through either 0.45 or 0.2  $\mu\text{m}$  membrane filters. All concentration data for water samples (filtered or unfiltered) are given in units of pmol/kg of water. Particulate RE data have units of either pmol/kg of water or ppm with respect to the weight of particles.

The geographical location of the oceanic data presented in this report can be found by referring to the map in figure 1. Each table in this technical report contains a map # which can be traced to the same map # in figure 1. This map appears as figure 13 in the Handbook article.

Microsoft EXCEL (PC, 6.0) files of tables A1-A14 are available on request to the author of this report. Table 1 lists the names of each EXCEL file in the different "A" tables. The EXCEL file name of each sub-table also can be found at the beginning of each section and on each of the printed sub-tables in this report.

**Table 1**  
**List of EXCEL File Names in the Tables A1-14.**

**Table A1: Section 5.1 of Handbook - Lanthanide composition and aquatic chemistry of river water**

File name: RIV\_DIS.XLS. Compilation of dissolved RE concentrations of river water.

**Table A2: Section 5.1 of Handbook - Lanthanide composition and aquatic chemistry of river water**

File name: RIV\_PART.XLS. Compilation of RE concentrations of river suspended particles and sediments.

**Table A3: Section 5.2 of Handbook - The estuarine chemistry of the lanthanides.**

File name: GWHALE.XLS. Great Whale River estuary, Quebec

File name: GIRONDE.XLS. Gironde River estuary, France

File name: AMAZON.XLS. Amazon River Estuary, Brazil

File name: CBAYSE.XLS. Surface waters, subsurface waters and shelf waters of Chesapeake Bay

File name: CBAY92.XLS. Chesapeake Bay bottom water time-series

File name: FLY.XLS. Fly River estuary, Papua New Guinea.

File name: ELDERF.XLS. Data from a suite of estuaries presented in Elderfield et al. (1990)

**Table A4: Not applicable, see text**

**Table A5: Section 6.1 of Handbook. Atlantic Ocean seawater**

File name: NdSm\_A.XLS. Concentration of Nd and Sm only for the Atlantic Ocean.

## Table 1 Cont'd

### **Table A6: Section 6.1 of Handbook. Atlantic Ocean seawater**

File name: ASW\_CONC.XLS. Concentration of RE in the Atlantic Ocean.

File name: SARG\_DIS.XLS. Concentration of dissolved RE in the Sargasso Sea from Sholkovitz et al. (1994)

File name: SARG\_PAR.XLS. Concentration of suspended particles in the Sargasso Sea from Sholkovitz et al. (1994). Data on the chemical leaching of particles [acetic acid, strong mineral acid and bomb/strong acid dissolution]. Data in per kg of seawater

### **Table A7: Handbook section 6.1. Pacific Ocean seawater**

File name: PSW\_CONC.XLS. Concentration of RE in Pacific Ocean seawater

### **Table A8: Handbook section 6.1. Indian Ocean seawater**

File name: IND\_CONC.XLS. Concentration of RE in Indian Ocean seawater

### **Table A9: Handbook section 6.1. Pacific Ocean seawater**

File names: HE1.XLS, HE2.XLS and HE3.XLS  
H. Elderfield's unpublished data on the concentration of RE in Pacific Ocean seawater

### **Table A10: Handbook section 6.1. Arctic Ocean seawater**

File name: ARC\_CONC.XLS. Concentration of RE in Arctic Ocean seawater (North Atlantic sector)

### **Table A11: Handbook section 6.1 and 7.1. Mediterranean Sea.**

File name: MED\_CONC.XLS. Concentration of RE in the Mediterranean Sea, including the anoxic brines of Bannock Basin

## Table 1 Cont'd

### **Table A12: Handbook section 7.1. Anoxic Basins**

File name: BLACKSEA.XLS. Concentration of RE in the Black Sea

File name: SAANICH.XLS. Dissolved and suspended concentrations of RE in  
Saanich Inlet, British Columbia, Canada

File name: CARIACO.XLS. Concentration of RE in the Cariaco Trench.

See also Chesapeake Bay data in Table A3 files

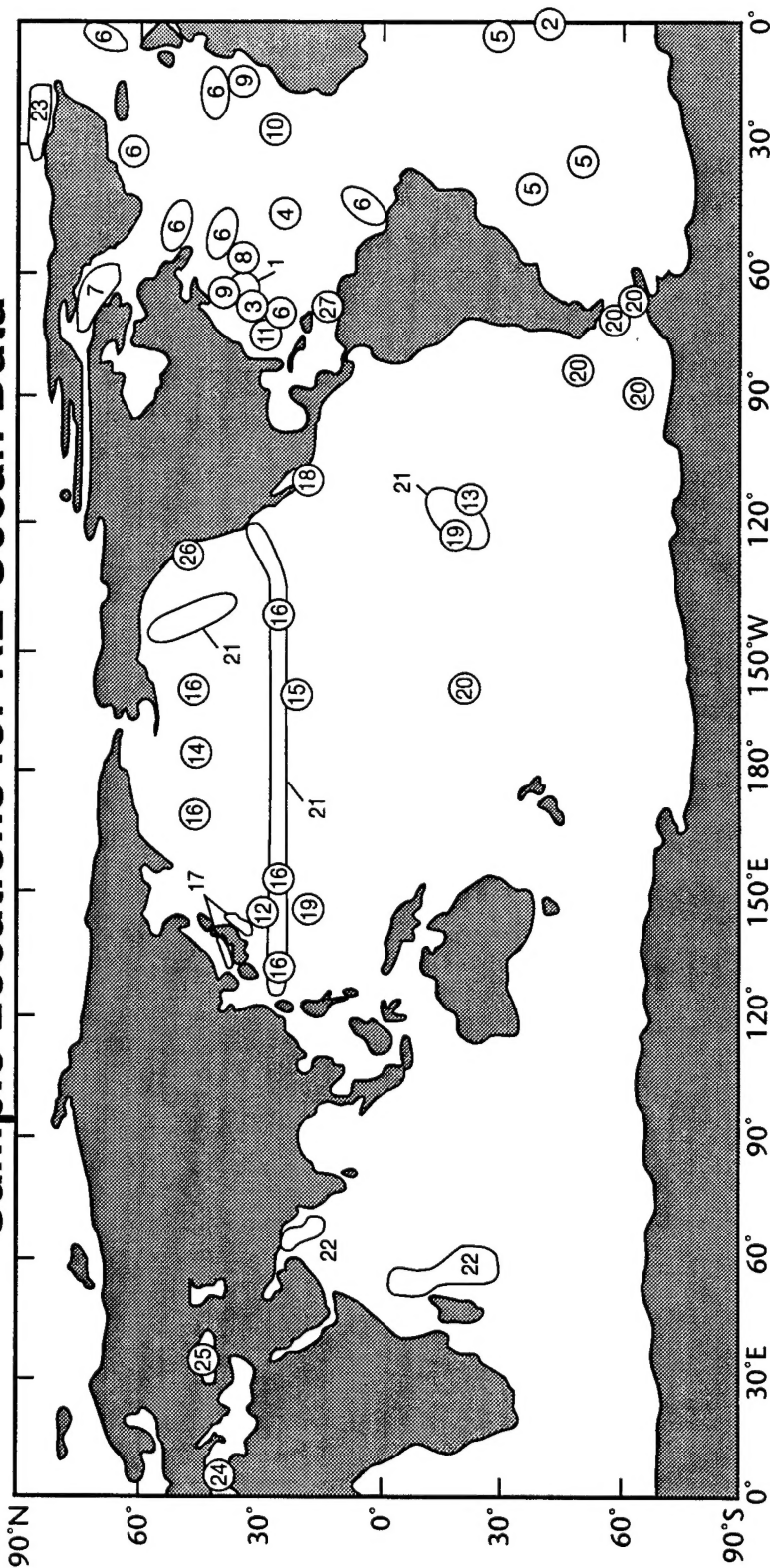
### **Table A13: Handbook section 7.2. Marine Pore Waters**

File name: PW\_REE.XLS. Concentration of RE in pore waters

### **Table A14: Handbook section 7.3. Marine hydrothermal vent waters**

File name: VENTS.XLS. Concentration of RE in the hydrothermal waters of the  
Atlantic and Pacific Oceans.

# Sample Locations for RE Ocean Data



## Atlantic Ocean

1. Jeandel, et. al. (1995)
2. German, et. al. (1995)
3. Sholkovitz, et. al. (1994)
4. Mitra, et. al. (1994)
5. Jeandel, C., (1993)
3. DeBarr, H., (1991)
3. Sholkovitz & Schneider (1991)
6. Piepgras and Wasserburg (1987)
7. Stordal and Wasserburg (1986)
8. DeBarr, et. al. (1983)
9. Piepgras and Wasserburg (1983)
10. Elderfield and Greaves (1982)
11. Piepgras and Wasserburg (1980)

## Pacific Ocean

12. Zhang, et. al. (1994)
13. Moller, et. al. (1994)
14. Shimizu, et. al. (1994)
15. Esser, et. al. (1994)
16. Piepgras and Jacobsen (1988, 92)
17. Tanaka, et. al. (1990)
18. DeBarr, et. al. (1985)
19. Klinkhammer, et. al. (1983)
20. Piepgras and Wasserburg (1982)
20. Piepgras and Wasserburg (1979, 80)
21. Elderfield, in preparation

## Indian Ocean

22. Bertram and Elderfield (1993)

22. German and Elderfield (1990)

## Arctic Ocean

23. Westerlund and Ohman (1992)

## Mediterranean Sea

24. Greaves, et. al. (1991)

24. Spivak & Wasserburg (1988)

## Anoxic Basins

25. Schijf, et. al. (1991)

25. German, et. al. (1991)

26. German and Elderfield (1989)

27. DeBarr, et. al. (1988)

## References Associated with Tables A1-A14

### Rivers: Table A1 and A2

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#### **Arctic Ocean: Table A10**

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[Data presented in section on Estuaries]

### Pore Water: Table A13

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#### **Acknowledgments**

I would like to thank David Schneider (WHOI) for his help in producing the compilation of data in this report from the data in the literature. Harry Elderfield generously provided his unpublished data from the Pacific Ocean. I would to thank the Woods Hole Oceanographic Institution for financial support during the production of this report.

**Table A1: Section 5.1 of Handbook - Lanthanide composition and aquatic chemistry of river water**

File name: RIV\_DIS.XLS. Compilation of dissolved RE concentrations of river water.

|   |                     |   |      |      |      |      |      |      |      |      |      |       |
|---|---------------------|---|------|------|------|------|------|------|------|------|------|-------|
| riv_dis.xls                                       |                     |   |      |      |      |      |      |      |      |      |      |       |
| Concentrations of River Water:                    |                     |   |      |      |      |      |      |      |      |      |      |       |
| Dissolved, Colloidal and Ultrafiltrated Fractions |                     |   |      |      |      |      |      |      |      |      |      |       |
|   |                     | La  | Ce   | Nd   | Sm   | Eu   | Gd   | Dy   | Er   | Yb   | Lu   | Er/Nd |
|   |                     | [pmol/kg]                                 |      |      |      |      |      |      |      |      |      |       |
|   | filter size (um)*** |   |      |      |      |      |      |      |      |      |      |       |
| Martin et al. (1976)                              |                     |   |      |      |      |      |      |      |      |      |      |       |
| Garrone & Dordogne                                | 0.45                | 344                                       | 564  | 363  | 51.9 | 9.7  | 5.4  |      | 25.1 | 21   | 3.7  | 0.95  |
| Goldstein and Jacobsen (1988a)                    |                     |   |      |      |      |      |      |      |      |      |      |       |
| Amazon  | 0.45                | 532                                       | 1514 | 880  | 229  | 52   |      | 193  | 99.3 | 88.4 |      | 0.113 |
| Great Whale                                       | 0.22                | 1634                                      | 2405 | 1158 | 158  | 25.1 | 105  | 68.3 | 34.4 | 33.2 | 5.38 | 0.030 |
| Indus   | 0.22                | 20.9                                      | 17.2 | 22.2 | 4.72 | 1.45 | 7.69 | 5.68 | 5.43 | 0.97 |      | 0.245 |
| Isua-F  | 0.22                | 4384                                      | 8708 | 3134 | 482  | 71.1 | 320  | 223  | 105  | 83.2 | 12.1 | 0.034 |
| Mississippi.                                      | 0.22                | 142                                       | 69.1 | 138  | 29.9 | 7.3  |      | 46.5 | 39.1 | 35.0 |      | 0.283 |
| Ohio  | 0.22                | 45.4                                      | 74.9 | 74.8 | 16.9 | 4.34 |      | 34.6 | 27.1 | 20.9 | 3.31 | 0.362 |
| Pampanga  | 0.22                | 30.8                                      | 67.7 | 59.6 | 16.6 | 5.39 |      | 23.9 | 17.5 | 15.7 |      | 0.294 |
| Shinano   | 0.22                | 269                                       | 596  | 344  | 73.1 | 17.2 |      | 74.5 | 44.1 | 41   | 9.14 | 0.128 |
| Avg. River  |                     | 222                                       | 460  | 283  | 71.9 | 17.5 |      | 70.8 | 50.5 | 35.2 |      | 0.178 |
| Elderfield et al. (1990)                          |                     |   |      |      |      |      |      |      |      |      |      |       |
|   |                     | {date, salinity after name of each river} |      |      |      |      |      |      |      |      |      |       |
| Amazon  | 0.45                | 355                                       | 847  | 570  | 145  | 35.3 | 185  | 121  | 65   | 52.2 | 6.93 | 0.114 |
| Connecticut, 27.04.83                             | 1                   | 4130                                      | 5450 | 2710 | 507  | 98.4 | 454  | 328  | 170  | 197  | 21.7 | 0.063 |
| Connecticut, 28.04.84                             | 1                   | 2600                                      | 4340 | 2240 | 422  | 81.4 | 348  | 269  | 140  | 132  | 17.6 | 0.063 |
| Mullica, 24.04.84                                 | 0.45                | 2410                                      | 4970 | 3000 | 602  | 127  |      | 340  | 247  | 190  | 29.4 | 0.082 |
| Mullica, 24.04.85                                 | 0.45                | 1790                                      | 4100 | 2700 | 556  | 125  | 49.4 | 363  | 210  | 182  | 28.3 | 0.078 |
| Delaware, 29.04.84                                | 0.45                | 215                                       | 402  | 232  | 50.5 | 11   | 61.2 | 43.7 | 29.6 | 40.2 | 6.01 | 0.128 |
| Delaware, 29.04.85, 0.05                          | 0.45                | 135                                       | 168  | 124  | 28.6 | 6.69 | 37.1 | 33.3 | 22.3 | 28.7 | 4.65 | 0.180 |
| Tamar, 17.04.85                                   | 0.45                | 310                                       | 745  | 722  | 176  | 41.9 | 182  | 124  | 68.5 | 62.2 | 10.1 | 0.095 |
| Tamar, 12.08.85, 0.04                             | 0.45                | 577                                       | 1010 | 914  | 238  | 59.5 | 255  | 174  | 98   | 95.2 | 15.6 | 0.107 |
| Tamar, 12.08.85, 0.043                            | 0.45                | 540                                       | 368  | 614  | 162  | 40.5 | 191  | 116  | 75.6 |      | 13.4 | 0.123 |
| Tamar, 12.08.85, 0.044                            | 0.45                | 480                                       | 497  | 779  | 203  | 50.6 | 220  | 145  | 79.5 | 73.6 | 12.1 | 0.102 |
| Tamar, 12.08.85, 0.049                            | 0.45                |   | 640  | 854  | 218  | 53.6 |      | 150  | 82.8 | 84.5 | 12.7 | 0.097 |
| Tamar, 12.08.85, 0.064                            | 0.45                | 400                                       |      |      | 319  | 74.4 | 333  | 204  | 93.6 |      | 14.1 |       |
| Tamar, 19.08.85, 0.02                             | 0.45                |   | 239  | 260  | 62.8 | 15.4 | 70.6 | 47.3 | 30   | 30.6 | 5.63 | 0.115 |
| Tamar, 19.08.85, 0.02                             | 0.45                | 182                                       | 269  | 268  | 64   | 15.4 | 66.1 | 47   | 28.9 | 30   | 5.01 | 0.108 |
| Tamar, 19.08.85, 0.02                             | 0.45                | 173                                       | 258  | 241  | 57   | 13.7 | 62.4 | 39.9 | 24.7 | 27.3 | 4.31 | 0.102 |
| Tamar, 19.08.85, 0.04                             | 0.45                |   | 307  | 212  | 49.7 | 11.8 |      | 34.4 | 22   | 24.6 | 4.27 | 0.104 |
| Swale 02.02.86                                    | 0.45                | 2400                                      | 4800 | 3320 | 810  | 208  | 1000 | 610  | 267  | 190  | 27   | 0.080 |
| Dove, 02.02.86                                    | 0.45                | 654                                       | 1530 |      | 330  | 80   |      | 250  | 118  | 109  | 16   |       |
| Warfe, 02.02.86                                   | 0.45                | 724                                       | 1130 | 755  | 163  | 31.7 |      | 101  | 50   | 41.1 | 6.1  | 0.066 |
| Rye, 02.02.86                                     | 0.45                |   | 1350 | 725  | 195  | 48   | 206  | 151  | 72.3 | 64.5 | 11.1 | 0.100 |
| Nidd, 02.02.86                                    | 0.45                | 664                                       | 1250 | 1650 | 261  | 65.6 |      | 190  | 94.4 |      |      | 0.057 |
| Derwent, 02.02.86                                 | 0.45                | 557                                       | 1130 | 670  | 151  | 33.2 | 150  | 113  | 59.1 | 53.9 | 8.06 | 0.088 |
| high flow   |                     |   |      |      |      |      |      |      |      |      |      |       |
| Derwent, 08.02.86                                 | 0.45                | 127                                       | 297  | 190  | 45.6 | 11.3 | 54.6 | 39.2 | 22.8 | 18.4 | 3.2  | 0.120 |
| low flow  |                     |   |      |      |      |      |      |      |      |      |      |       |
|   |                     |   |      |      |      |      |      |      |      |      |      |       |
|   |                     |   |      |      |      |      |      |      |      |      |      |       |

[illegible]

|   |           | La                | Ce   | Nd   | Sm   | Eu   | Gd   | Dy   | Er   | Yb   | Lu   | Er/Nd |
|---|-----------|-------------------|------|------|------|------|------|------|------|------|------|-------|
| <b>Sholkovitz (1992, 1995)</b>  |           | Connecticut River |      |      |      |      |      |      |      |      |      |       |
| 17-Jun-91   |           |                   |      |      |      |      |      |      |      |      |      |       |
| #80   | 0.45      | 195               | 292  | 180  | 36.0 | 6.92 | 38.1 | 27.9 | 21.6 | 27.6 | 4.67 | 0.120 |
| #81   | 0.22      | 78.8              | 85.8 | 82.9 | 17.0 | 3.26 | 22.0 | 15.9 | 14.8 | 22.6 | 4.08 | 0.178 |
| #83   | 0.025 (1) | 38.8              | 45.6 | 49.2 | 10.9 | 2.00 | 16.7 | 11.8 | 13.1 | 21.3 | 3.87 | 0.266 |
| #84   | 0.025 (2) | 42.6              | 43.8 | 48.6 | 11.1 | 2.08 | 16.9 | 12.1 | 13.4 | 21.6 | 3.94 | 0.275 |
| 22-Sep-91   |           |                   |      |      |      |      |      |      |      |      |      |       |
| #105  | 0.45      | 168               | 222  | 178  | 36.4 | 7.05 | 40.3 | 28.9 | 22.9 | 30.7 | 5.36 | 0.129 |
| #106  | 0.22      | 154               | 196  | 166  | 33.5 | 6.52 | 37.3 | 27.2 | 21.9 | 30.2 | 5.11 | 0.132 |
| #107  | 0.025     | 101               | 122  | 112  | 24.4 | 4.72 | 29.2 | 21.4 | 19.0 | 27.5 | 4.83 | 0.169 |
| #108  | 0.025     | 95.3              | 119  | 109  | 23.5 | 4.61 | 28.7 | 21.0 | 19.1 | 27.9 | 4.60 | 0.175 |
| 20 JULY 1992  |           |                   |      |      |      |      |      |      |      |      |      |       |
| #224  | < 5 K*    | 12.8              | 13.5 | 16.1 | 3.95 | 0.90 | 8.57 | 7.02 | 9.70 | 18.7 | 3.59 | 0.604 |
| #223  | < 50 K    | 19.1              | 22.3 | 25.7 | 6.33 | 1.38 | 11.9 | 9.35 | 11.7 | 21.2 | 4.04 | 0.457 |
| #222  | 0.22      | 148               | 184  | 143  | 27.6 | 5.72 | 29.8 | 23.0 | 18.3 | 27.0 | 4.44 | 0.128 |
| 17 DEC. 1992  |           |                   |      |      |      |      |      |      |      |      |      |       |
| #339  | < 5 K     |                   | 74.4 | 87.3 | 17.1 | 3.58 | 27.2 | 19.1 | 18.5 | 29.7 | 5.00 | 0.212 |
| #340  | < 50 K    |                   | 163  | 179  | 33.0 | 7.60 | 50.4 | 34.6 | 28.9 | 40.0 | 5.60 | 0.161 |
| #394  | 0.22 um   |                   | 680  | 576  | 89.4 | 19.6 | 114  | 87.7 | 59.8 | 68.0 | 8.83 | 0.104 |
| <b>Sholkovitz (1992, 1995)</b>  |           |                   |      |      |      |      |      |      |      |      |      |       |
| 23 Oct. 1992  |           | Ultrafiltrates*   |      |      |      |      |      |      |      |      |      |       |
| Hudson River  |           |                   |      |      |      |      |      |      |      |      |      |       |
| #289  | <5K(1)**  |                   | 110  | 111  | 20.8 | 5.42 | 34.5 | 26.4 | 22.2 | 22.4 | 2.77 | 0.200 |
| #308  | <5K(2)    |                   | 102  | 109  | 21.9 | 4.31 | 32.2 | 24.7 | 18.0 | 21.9 | 2.95 | 0.165 |
| #303  | <50K      |                   | 213  | 209  | 41.4 | 8.22 | 60.1 | 46.5 | 30.3 | 34.7 | 4.00 | 0.145 |
| #305  | 0.025     |                   | 320  | 310  | 56.4 | 12.6 | 89.9 | 62.8 | 39.5 | 44.1 | 5.19 | 0.128 |
| #304  | 0.22      |                   | 443  | 423  | 78.8 | 17.0 | 121  | 81.6 | 49.5 | 52.4 | 3.91 | 0.117 |
| Colloids**  |           |                   |      |      |      |      |      |      |      |      |      |       |
| #302  | >50K      |                   | 2843 | 2547 | 492  | 88.1 | 593  | 401  | 227  | 221  | 27.9 | 0.089 |
| #301  | >5K(1)**  |                   | 4142 | 3903 | 719  | 132  | 981  | 654  | 390  | 363  | 45.8 | 0.100 |
| #309  | >5K(2)    |                   | 4071 | 3901 | 719  | 144  | 1028 | 642  | 391  | 370  | 47.9 | 0.100 |
| Colloids  |           |                   |      |      |      |      |      |      |      |      |      |       |
| Conn R. 20 July 1992  |           |                   |      |      |      |      |      |      |      |      |      |       |
| #225  | > 50 K**  | 2059              | 2523 | 1905 | 354  | 71.0 | 324  |      |      |      |      |       |
| #226  | > 5 K     | 3305              | 4045 | 3143 | 590  | 120  | 544  | 412  | 253  | 223  | 31.4 | 0.081 |
| Conn R. 17 Dec. 1992  |           |                   |      |      |      |      |      |      |      |      |      |       |
| #343  | >50K      |                   | 5677 | 4726 | 815  | 168  | 999  | 673  | 366  | 353  | 40.9 | 0.077 |
| #344  | >5K       |                   | 4852 | 4099 | 657  | 165  | 837  | 622  | 359  | 360  | 46.8 | 0.088 |
| #, I.D number for analyses in Sholkovitz's laboratory   |           |                   |      |      |      |      |      |      |      |      |      |       |
| * ultrafiltrate   |           |                   |      |      |      |      |      |      |      |      |      |       |
| **retentate from ultrafiltration  |           |                   |      |      |      |      |      |      |      |      |      |       |
| ***, filter size in unit of um except for ultrafiltration where nominal molecular wt. cuts are used |           |                   |      |      |      |      |      |      |      |      |      |       |

**Table A2: Section 5.1 of Handbook - Lanthanide composition and aquatic chemistry of river water**

File name: RIV\_PART.XLS. Compilation of RE concentrations of river suspended particles and sediments.

| Rivers: Suspended Particles and Sediments       |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|---|--|-----|-----|-----|----|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| riv_part.xls                                    |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    | [ppm] |     |     |     |     |     |     |     |     |     |
|   |  | La  | Ce  | Pr  | Nd | Sm    | Eu  | Gd  | Tb  | Dy  | Ho  | Er  | Tm  | Yb  | Lu  |
| Goldstein and Jacobsen (1988a), [TIMS]          |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
| Amazon  |  | 35  | 73  |     | 33 | 5.9   | 1.1 | 4.2 |     | 2.6 |     | 1.2 |     | 1   | 0.2 |
| Gr. Whale                                       |  | 52  | 103 |     | 39 | 5.8   | 1.1 |     |     | 2.9 |     | 1.5 |     | 1.3 | 0.2 |
| Indus   |  | 19  | 41  |     | 19 | 3.7   | 0.9 | 3   |     | 2.5 |     | 1.2 |     | 1.1 | 0.2 |
| Isua-F  |  | 73  | 143 |     | 52 | 8     | 1.1 | 5.5 |     | 3.7 |     | 1.5 |     | 1.4 | 0.2 |
| Miss.   |  | 44  | 93  |     | 40 | 7.5   | 1.5 | 5.9 |     | 5.1 |     | 2.4 |     | 2.1 | 0.3 |
| Ohio  |  | 41  | 84  |     | 37 | 6.9   | 1.4 | 5.1 |     | 4   |     | 1.9 |     | 1.5 |     |
| Murray  |  | 38  | 71  |     | 35 | 7     | 1.6 | 5.7 |     | 4.6 |     | 2.1 |     | 1.8 | 0.3 |
| Pampanga  |  | 7.7 | 18  |     | 13 | 3.6   | 1.1 | 4.9 |     | 4.7 |     | 2.9 |     | 2.7 | 0.4 |
| Shinano   |  | 29  | 63  |     | 27 | 5.8   | 1.2 | 5.4 |     | 4.7 |     | 2.5 |     | 2.3 | 0.4 |
| Avg. River                                      |  | 40  | 81  |     | 36 | 6.9   | 1.4 | 5.3 |     | 4.2 |     | 2   |     | 1.7 | 0.3 |
| Martin et al. (1976), [INAA]                    |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
| Amazon  |  | 48  | 112 |     |    | 9.7   | 1.8 |     |     |     |     |     |     | 3.7 | 0.6 |
| Congo   |  | 47  | 104 |     |    |       | 1.5 |     | 1.6 |     |     |     |     | 2.4 | 0.4 |
| Ganges  |  | 42  | 98  |     | 48 | 9.7   | 1.2 |     | 0.7 |     |     |     | 0.4 | 3.2 | 0.5 |
| Mekong  |  | 48  | 93  | 8.5 | 47 | 5.4   | 1.5 | 5.3 | 0.9 |     | 0.9 | 2.7 | 0.5 | 3.6 | 0.6 |
| Garrone   |  | 44  | 93  | 8.2 | 36 | 6.2   | 1.1 | 6.1 | 0.9 |     | 0.9 | 2.4 | 0.4 | 2.8 | 0.4 |
| Martin and Maybeck (1979), [INAA]               |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
| Amazon  |  | 48  | 112 |     |    | 9.7   | 1.8 |     |     |     |     |     |     | 3.7 | 0.6 |
| Congo   |  | 50  | 90  |     |    |       | 1.6 | 2.5 | 1.6 |     |     |     |     | 2.6 | 0.4 |
| Danube  |  | 28  | 65  |     |    | 6.3   | 1.5 |     | 0.6 |     |     |     |     | 4.6 | 0.5 |
| Ganges  |  | 42  | 98  |     | 48 | 9.7   | 1.2 |     | 0.7 |     |     |     | 0.4 | 3.2 | 0.5 |
| Garonne   |  | 44  | 93  | 8.2 | 36 | 6.2   | 1.1 | 6.1 | 0.9 |     | 0.9 | 2.4 | 0.4 | 2.8 | 0.4 |
| Magdalena                                       |  | 37  |     |     |    | 6.7   | 1.4 |     |     |     |     |     |     | 3.7 |     |
| Mekong  |  | 48  | 93  | 8.5 | 47 | 5.4   | 1.5 | 5.3 | 0.9 |     | 0.9 | 2.7 | 0.5 | 3.2 | 0.6 |
| Parana  |  | 50  |     |     |    | 9.1   | 2   |     |     |     |     |     |     | 3.5 | 0.6 |
| Somayajulu et al. (1993), [INAA] Indian Rivers  |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
| Godavari #14                                    |  | 40  | 78  |     | 32 | 6.2   | 1.6 |     | 0.9 |     |     |     |     | 2.7 |     |
| Godavari #13                                    |  | 30  | 63  |     | 26 | 4.9   | 1.2 |     | 0.8 |     |     |     |     | 2   |     |
| Gordeev et al., (1985), [ INAA] Amazon Rivers   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
| Rio Negro                                       |  | 46  | 112 |     | 49 | 7.6   | 1.6 |     | 2.7 |     |     |     | 1.3 | 8.6 | 1.5 |
| Clear Water Rivers                              |  | 55  | 132 |     | 60 | 12    | 2.3 | 10  | 2   |     |     |     | 1   | 8   | 1.4 |
| Maderia   |  | 44  | 92  |     | 37 | 5     | 0.9 |     | 1.1 |     |     |     |     | 3.2 |     |
| Amazon  |  | 44  | 114 |     | 42 | 8.7   | 1.7 |     | 1.2 |     |     |     | 0.5 | 2.8 | 0.5 |
| TIMS = thermal ionization mass spectrometry     |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
| INAA = instrumental neutron activation analysis |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |
|   |  |     |     |     |    |       |     |     |     |     |     |     |     |     |     |

|  |            | La | Ce | Pr | Nd  | Sm  | Eu  | Gd  | Tb  | Dy  | Ho  | Er  | Tm | Yb  | Lu  |
|--|------------|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|
| <b>Sholkovitz (1995, unpubl.) TIMS</b>                   |            |    |    |    |     |     |     |     |     |     |     |     |    |     |     |
| <b>Amazon</b>  | ICP, #420  | 49 | 99 |    | 48  | 8.7 | 1.7 | 7.3 |     | 6.4 |     | 3.6 |    | 3.5 | 0.5 |
| S'd part.  | fusion     |    |    |    |     |     |     |     |     |     |     |     |    |     |     |
| Aug-89   |            |    |    |    |     |     |     |     |     |     |     |     |    |     |     |
| <b>Miss. R</b>   | TIMS, #494 | 35 | 74 |    | 34  | 6.2 | 1.3 | 6.5 |     | 5.1 |     | 3.5 |    | 2.8 | 0.4 |
| S'd part.  | fusion     |    |    |    |     |     |     |     |     |     |     |     |    |     |     |
| V'sBurg  | Aug. 1993  |    |    |    |     |     |     |     |     |     |     |     |    |     |     |
| <b>Fly R</b>   | TIMS, #583 | 35 | 74 |    | 35  | 7.7 | 1.5 | 6.7 |     | 4.4 |     | 2.6 |    | 2.5 | 0.3 |
| Papua New Guinea   |            |    |    |    |     |     |     |     |     |     |     |     |    |     |     |
| S'd part.  | fusion     |    |    |    |     |     |     |     |     |     |     |     |    |     |     |
| Jan-94   |            |    |    |    |     |     |     |     |     |     |     |     |    |     |     |
| <b>Fly R</b>   | TIMS, #581 |    | 71 |    | 32  | 7.4 | 1.4 | 6.9 |     | 5   |     | 3   |    | 2.8 | 0.4 |
| river bank sediment                                      |            |    |    |    |     |     |     |     |     |     |     |     |    |     |     |
| Jan-94   |            |    |    |    |     |     |     |     |     |     |     |     |    |     |     |
| fusion   |            |    |    |    |     |     |     |     |     |     |     |     |    |     |     |
| <b>Conn R</b>  | TIMS, #550 | 32 | 71 |    | 34  | 6.7 | 1.4 | 6.2 |     | 5.8 |     | 3.4 |    | 3.2 | 0.4 |
| S'd part.  | fusion     |    |    |    |     |     |     |     |     |     |     |     |    |     |     |
| Jun-91   |            |    |    |    |     |     |     |     |     |     |     |     |    |     |     |
| <b>Sepik R.</b>  | ICP, #405  | 21 | 47 | 25 | 4.7 | 1.1 | 4.2 | 4.2 | 2.4 | 2.5 | 0.4 |     |    |     |     |
| Papua New Guinea   |            |    |    |    |     |     |     |     |     |     |     |     |    |     |     |
| 25 km up river from mouth                                |            |    |    |    |     |     |     |     |     |     |     |     |    |     |     |
| bottom sediment  |            |    |    |    |     |     |     |     |     |     |     |     |    |     |     |
| fusion   |            |    |    |    |     |     |     |     |     |     |     |     |    |     |     |
| fusion = total dissolution of solid by metaborate fusion |            |    |    |    |     |     |     |     |     |     |     |     |    |     |     |
| ICP = inductively coupled plasma -emission spectroscopy  |            |    |    |    |     |     |     |     |     |     |     |     |    |     |     |

**Table A3: Section 5.2 of Handbook - The estuarine chemistry of the lanthanides.**

File name: GWHALE.XLS. Great Whale River estuary, Quebec

File name: GIRONDE.XLS. Gironde River estuary, France

File name: AMAZON.XLS. Amazon River Estuary, Brazil

File name: CBAYSE.XLS. Surface waters, subsurface waters and shelf waters of Chesapeake Bay

File name: CBAY92.XLS. Chesapeake Bay bottom water time-series

File name: FLY.XLS. Fly River estuary, Papua New Guinea.

File name: ELDERF.XLS. Data from a suite of estuaries presented in Elderfield et al. (1992)

GWHALE.XLS

| Great Whale River (Quebec) Estuary<br>and Hudson Bay |      |      |      |      |      |      |      |      |      |      |
|--|------|------|------|------|------|------|------|------|------|------|
| Goldstein and Jacobsen (1988b)                       |      |      |      |      |      |      |      |      |      |      |
| * 0.22 um filtrate                                   |      |      |      |      |      |      |      |      |      |      |
| Salinity   | La   | Ce   | Nd   | Sm   | Eu   | Gd   | Dy   | Er   | Yb   | Lu   |
| [pmol/kg]  |      |      |      |      |      |      |      |      |      |      |
| 0.004  | 1634 | 2405 | 1158 | 158  | 25.1 | 105  | 68.3 | 34.4 | 33.2 | 5.38 |
| 0.37   | 1375 | 2048 | 1040 | 144  | 22.5 |      | 59.7 | 29.4 |      |      |
| 1.69   | 711  | 1056 | 540  | 76.5 | 12.2 |      | 33.4 | 19.4 | 18.8 | 3.00 |
| 3.93   | 542  | 928  | 449  | 69.8 | 11.0 |      | 29.8 | 17.4 |      |      |
| 5.22   | 384  | 785  | 384  | 60.0 | 8.56 |      | 29.3 | 19.9 |      |      |
| 14.9   | 366  | 449  | 239  | 31.1 | 5.33 |      | 16.9 | 11.1 |      |      |
| 21.9   | 246  | 226  | 139  | 20.0 | 4.01 |      | 17.3 | 12.7 | 14.8 | 2.12 |
| Hudson Bay   |      |      |      |      |      |      |      |      |      |      |
| 31   | 170  | 123  | 100  | 15   | 2.82 | 13.9 | 13.2 | 10.2 | 10.1 |      |

GIRONDE.XLS

| Gironde River (France) Estuary |      |      |      |      |      |      |      |      |     |      |      |      |      |      |
|--------------------------------|------|------|------|------|------|------|------|------|-----|------|------|------|------|------|
| Martin et al. (1976)           |      |      |      |      |      |      |      |      |     |      |      |      |      |      |
| 0.45 um filtrate               |      |      |      |      |      |      |      |      |     |      |      |      |      |      |
| Salinity                       | La   | Ce   | Pr   | Nd   | Sm   | Eu   | Gd   | Tb   | Dy  | Ho   | Er   | Tm   | Yb   | Lu   |
| [pmol/l]                       |      |      |      |      |      |      |      |      |     |      |      |      |      |      |
| 0.1 [river]                    | 344  | 564  | 52.0 | 263  | 51.9 | 9.7  | 54   | 7.8  |     | 8.7  | 25.1 | 3.6  | 21.0 | 3.7  |
| 0.42                           | 142  | 228  | 25.6 | 96.4 | 20   | 3.9  |      |      |     |      |      |      | 18.5 | 3.5  |
| 7.0                            | 39.6 | 80.6 | 10.6 | 68   | 8.0  | 2.4  | 11.5 | 1.6  |     | 2.2  |      |      | 8.7  | 1.7  |
| 28.3                           | 56.1 | 78.4 | 6.4  | 35.4 |      | 0.86 | 6.2  | 0.80 |     | 0.97 | 4.2  | 0.72 | 3.1  | 0.49 |
| 35 [ocean]                     | 24.5 | 8.6  | 4.5  | 19.4 | 3.0  | 0.85 | 4.4  | 0.88 | 5.6 | 1.3  | 5.2  | 1.0  | 4.7  | 0.86 |

| amazon.xls        |      |      |      |      | Amazon Estuary                  |         |      |      |      |      |      |       |
|-------------------|------|------|------|------|---------------------------------|---------|------|------|------|------|------|-------|
|                   |      |      |      |      | [AmasSeds   Cruise - Aug. 1989] |         |      |      |      |      |      |       |
| Sholkovitz (1993) |      |      |      |      |                                 |         |      |      |      |      |      |       |
| 0.22 um filtrates |      |      |      |      |                                 |         |      |      |      |      |      |       |
| Surface Waters    |      | La   | Ce   | Nd   | Sm                              | Eu      | Gd   | Dy   | Er   | Yb   | Lu   | Ce    |
| Sta. #            | Sal  |      |      |      |                                 | pmol/kg |      |      |      |      |      | Anom. |
| I-1-18a           | 0.3  | 373  | 930  | 579  | 146                             | 35      | 150  | 130  | 70.4 | 56.8 | 7.25 | 1.00  |
| I-1-18b           | 0.3  | 305  | 754  | 471  | 123                             | 29.8    | 137  | 111  | 61.3 | 50.2 | 6.44 | 0.99  |
| I-1-19            | 0.84 | 211  | 504  | 346  | 84.2                            | 20      | 94.5 | 72.3 | 39.4 | 32.0 | 3.8  | 0.93  |
| I-1-20            | 5.5  | 22.8 | 36.6 | 33.5 | 9.3                             | 2.49    | 13.3 |      |      |      |      | 0.66  |
| I-1-53            | 5.8  | 20.6 | 34.6 | 29.4 | 8.7                             | 2.4     | 13   | 12.7 | 8.7  | 7.8  | 1.07 | 0.70  |
| I-1-29            | 6.6  | 17.9 | 29.0 | 26.3 | 7.6                             | 2.08    | 11.1 | 11.2 | 7.7  | 6.9  | 0.96 | 0.66  |
| I-1-30            | 9.5  | 20.1 | 31.2 | 27.7 | 8.0                             | 2.21    | 11.9 | 12.3 | 8.9  | 7.8  | 1.07 | 0.65  |
| I-1-30            | 11.8 | 22.6 | 34.5 | 28.2 | 7.5                             |         | 12.2 | 12.1 | 8.8  | 7.7  | 1.1  | 0.67  |
| I-1-21            | 17.8 | 27.5 | 38.2 | 30.7 | 7.7                             | 2.03    | 12.1 |      |      |      |      | 0.64  |
| I-1-22            | 21.9 | 29.7 | 41.5 | 34.1 | 8.7                             | 2.45    | 14.3 |      | 11.8 | 9.7  | 1.34 | 0.64  |
| I-1-50            | 24.3 | 29.4 | 32.1 | 33.6 | 8.8                             | 2.49    | 14.5 | 16.0 | 12.3 | 9.8  | 1.32 | 0.50  |
| I-1-35            | 27.6 | 35.7 | 33.3 | 41.2 | 10.6                            | 2.98    | 17.2 | 18.9 | 14.4 | 12.0 | 1.64 | 0.42  |
| I-1-23, r         | 33.4 | 30.0 | 35.4 | 35.3 | 8.8                             | 2.42    | 14   | 15.1 | 11.4 | 9.4  | 1.26 | 0.53  |
| I-1-23, r         | 33.4 | 29.8 | 35.1 | 36.5 | 9.9                             | 2.43    | 14.8 | 15.0 | 11.3 | 9.2  | 1.25 | 0.52  |
| I-1-14, r         | 34.5 | 35.5 | 29.5 | 40.8 | 10.4                            | 2.96    | 17.4 | 19.8 | 14.5 | 12.6 | 1.77 | 0.38  |
| I-1-14, r         | 34.5 | 35.4 | 30.2 | 42.4 | 11.8                            | 2.94    | 18.3 | 19.5 | 15.2 | 12.6 | 1.79 | 0.38  |
| I-1-3             | 35.5 | 11.1 | 13.8 | 13.6 | 4.0                             | 0.69    | 5.0  | 4.4  | 3.7  | 3.2  | 0.44 | 0.55  |
| I-1-24            | 36.4 | 19.0 | 22.3 | 24.8 | 4.3                             | 1.14    | 6.1  | 6.6  | 5.1  | 4    | 0.54 | 0.51  |
| I-1-12            | 36.4 | 10.4 | 14.3 | 12.8 | 3.5                             | 0.63    | 4.6  |      |      |      |      | 0.61  |
| I-1-9             | 36.6 | 15.6 | 15.6 | 16.6 | 4.2                             | 0.77    | 5.1  | 4.3  | 3.4  | 2.7  | 0.36 | 0.47  |
| Deep Waters       |      |      |      |      |                                 |         |      |      |      |      |      |       |
| 50-16M*           | 33.9 | 36.2 | 33.8 | 42.3 | 11.2                            | 2.84    | 17.2 | 17.3 | 12.8 | 10.6 | 1.42 | 0.42  |
| 20-10M            | 35.0 | 45.6 | 38.5 | 52   | 14.0                            | 3.47    | 22.1 | 24.3 | 18.0 | 15.5 | 2.09 | 0.39  |
| 22-10M            | 35.8 | 21.6 | 25.1 | 27.1 | 7.6                             | 1.69    | 10.0 | 9.2  | 6.2  | 5.1  | 0.69 | 0.51  |
| 53-19M            | 36.2 | 55.0 | 35.1 | 60.8 | 15.5                            | 3.93    | 24.2 | 25.3 | 19.4 | 15.8 | 2.11 | 0.29  |
| 30-21M            | 36.5 | 39.1 | 36.5 | 46.7 | 12.7                            | 3.26    | 20.0 | 20.9 | 15.8 | 12.8 | 1.73 | 0.42  |
| r = replicates    |      |      |      |      |                                 |         |      |      |      |      |      |       |
| * Sta # Depth     |      |      |      |      |                                 |         |      |      |      |      |      |       |

|   |      |       |      |       |                 |      |           |      |      |      |      |      |
|---|------|-------|------|-------|-----------------|------|-----------|------|------|------|------|------|
| cbayse.xls                                |      |       |      |       | Chesapeake Bay  |      |           |      |      |      |      |      |
|   |      |       |      |       | [July-Aug 1985] |      |           |      |      |      |      |      |
| Sholkovitz and Elderfield (1988)          |      |       |      |       |                 |      |           |      |      |      |      |      |
| 0.22 um                                   | Sal  |       | La   | Ce    | Nd              | Sm   | Eu        | Gd   | Dy   | Er   | Yb   | Lu   |
| filtrate                                  |      |       |      |       |                 |      | [pmol/kg] |      |      |      |      |      |
| 1. Near Surface (1 or 2 m) Samples        |      |       |      |       |                 |      |           |      |      |      |      |      |
| Sta. #                                    |      |       |      |       |                 |      |           |      |      |      |      |      |
| CB-20,a                                   | 1.21 |       | 17.5 |       |                 | 7.07 | 1.83      |      | 13.6 | 17.0 | 19.8 | 3.40 |
| CB-20,b                                   | 1.21 |       |      | 21.6  | 23.1            | 7.04 | 1.79      | 13.5 | 14.0 | 16.5 | 22.5 | 3.70 |
| CB-19,a                                   | 0.09 |       | 53.3 | 95.4  | 82.1            | 19.4 | 4.92      | 37.9 | 31.0 | 23.2 | 30.0 | 6.88 |
| CB-19,b                                   | 0.06 |       | 62.6 | 103.2 | 86.5            | 21.4 | 5.25      | 29.3 | 32.6 | 24.3 | 24.1 | 4.12 |
| CB-18                                     | 2.73 |       | 14.9 | 14.7  | 17.6            | 5.22 | 1.39      |      | 11.8 | 15.3 | 18.5 |      |
| CB-17                                     | 7.24 |       | 6.02 | 12.7  | 18.0            | 5.16 | 1.34      | 8.69 | 10.2 | 11.9 | 13.9 | 1.85 |
| CB-16                                     | 8.97 |       | 19.5 | 12.9  | 16.4            | 4.43 | 1.16      | 6.92 | 11.5 | 10.6 | 19.1 | 2.45 |
| CB-15                                     | 11.6 |       | 26.4 | 11.4  | 21.4            | 5.30 | 1.38      |      | 10.5 | 10.9 | 13.7 | 2.39 |
| CB-14,a                                   | 14.2 |       | 33.4 | 30.3  | 23.5            | 5.39 | 1.40      | 8.28 | 9.03 | 8.62 | 10.8 | 1.98 |
| CB-14,b                                   | 14.7 |       |      | 30.1  | 23.4            | 5.79 | 1.39      |      | 9.25 | 8.74 | 11.0 |      |
| CB-12                                     | 15.6 |       | 14.4 | 10.2  | 13.0            | 3.25 | 0.89      | 5.50 | 7.34 | 7.10 | 19.0 | 1.85 |
| CR-1                                      | 15.8 |       | 22.2 | 12.6  | 20.5            | 5.85 | 1.45      | 13   | 10.4 | 9.25 | 11.5 | 1.96 |
| CB-10                                     | 16.7 |       | 15.9 | 10.0  | 14.0            | 3.28 | 0.87      | 5.29 | 6.08 | 6.06 | 8.34 | 1.59 |
| CB-7                                      | 20.1 |       | 16.0 | 15.1  | 15.7            | 3.81 | 0.97      |      | 7.90 | 7.38 | 9.83 | 1.71 |
| CB-5                                      | 23.4 |       |      | 22.1  | 19              | 4.45 | 1.11      | 7.70 | 8.91 | 8.45 | 9.74 | 1.83 |
| CB-2                                      | 27.0 |       |      | 30.0  | 23.6            | 5.34 | 0.95      |      | 10.9 | 9.75 | 17.0 |      |
| CB-1                                      | 30.6 |       |      | 34.7  | 27.2            | 6.05 | 1.46      |      | 11.0 | 9.75 | 1.47 |      |
|   |      |       |      |       |                 |      |           |      |      |      |      |      |
|   |      |       |      |       |                 |      |           |      |      |      |      |      |
|   | Sal  | Depth | La   | Ce    | Nd              | Sm   | Eu        | Gd   | Dy   | Er   | Yb   | Lu   |
|   |      | (m)   |      |       |                 |      | pmol/kg   |      |      |      |      |      |
| 2. Subsurface waters                      |      |       |      |       |                 |      |           |      |      |      |      |      |
|   |      |       |      |       |                 |      |           |      |      |      |      |      |
| CR-1                                      | 15.9 | 5.0   | 21.4 | 11.2  | 17.6            | 4.39 | 1.17      |      | 8.54 | 8.42 | 11.1 | 2.01 |
| CR-1                                      | 16.5 | 8.7   | 32.1 | 25.5  | 26.1            | 6.75 | 1.64      | 9.69 | 9.29 | 8.25 | 10.3 | 1.93 |
| CR-1                                      | 19   | 13.0  | 43.7 | 36.0  | 27.7            | 6.11 | 1.55      | 10.1 | 8.00 | 7.14 | 9.89 | 1.32 |
| CR-1                                      | 19.4 | 16.0  | 45.8 | 39.6  | 29.7            | 6.49 | 1.63      | 9.89 | 8.53 | 7.30 | 8.95 | 1.59 |
| CR-1                                      | 20.4 | 21.5  | 51.7 | 39.3  | 32.9            | 6.88 | 1.73      | 10.4 | 9.26 | 7.61 | 8.89 | 1.66 |
| CB-10                                     | 21.5 | 10.0  | 29.8 | 29.2  | 17.7            | 3.60 | 0.92      | 5.13 | 5.89 | 5.70 | 7.42 | 1.5  |
| CB-12                                     | 20.9 | 22.0  | 68.3 | 91.5  | 47.3            | 9.27 | 1.77      |      | 15.3 | 13.5 | 12.8 | 2.18 |
| CB-14                                     | 19.1 | 37.0  |      | 56.2  | 34.8            | 7.34 | 1.86      |      | 10.3 | 8.63 | 10   |      |
|   |      |       |      |       |                 |      |           |      |      |      |      |      |
| 3. Shelf Waters outside of Chesapeake Bay |      |       |      |       |                 |      |           |      |      |      |      |      |
|   |      |       |      |       |                 |      |           |      |      |      |      |      |
| CS-1 (a)                                  | 32.9 | 2     | 35.1 | 18.3  | 27.9            | 5.79 | 1.4       | 8.08 | 10.5 | 8.91 | 9.18 | 1.54 |
| CS-1 (b)                                  | 32.9 | 2     | 30.2 | 17    | 25.9            | 5.38 | 1.18      |      | 10.9 | 8.37 |      | 1.57 |
| CS-1                                      | 35.4 | 90    | 23.5 | 10    | 17.7            | 3.62 | 0.9       | 5.16 | 5.93 | 4.97 | 4.7  | 0.76 |
| CS-2                                      | 33.1 | 3     |      |       |                 | 4.69 | 1.5       |      |      | 7.45 |      | 3.97 |
| CS-4                                      | 32.8 | 2     | 32.1 | 16.7  | 25              | 5.17 | 1.25      |      | 9.04 | 7.93 | 8.11 | 1.37 |

## CBAY92.XLS

| Chesapeake Bay Bottom Water Time-Series |           |      |      |      |      |      |      |      |      |      |       |
|---|-----------|------|------|------|------|------|------|------|------|------|-------|
| cbay92.xls                              |           |      |      |      |      |      |      |      |      |      |       |
| Sholkovitz et al. (1992)                |           |      |      |      |      |      |      |      |      |      |       |
| 0.22 um filtrate                        |           |      |      |      |      |      |      |      |      |      |       |
| Sample                                  | La        | Ce   | Nd   | Sm   | Eu   | Gd   | Dy   | Er   | Yb   | Lu   | Ce    |
|   | [pmol/kg] |      |      |      |      |      |      |      |      |      | Anom. |
| 10-Feb-88                               | 59.5      | 32.6 | 49.8 | 11.4 | 2.95 | 11.7 | 19.1 | 16.3 | 17.2 | 2.52 | 0.28  |
| 12-Apr-88                               | 56.6      | 46.7 | 47.8 | 11.7 | 2.89 | 17.1 | 17.4 | 14.8 | 15.6 | 2.33 | 0.42  |
| 17-May-88                               | 115       | 109  | 79.5 | 18.2 | 4.55 | 25.4 |      |      |      |      | 0.65  |
| 14-Jun-88                               | 108       | 156  | 85.1 | 18.6 | 4.59 | 24.2 | 22.6 | 16.5 | 15.9 | 2.37 | 0.75  |
| 6-Jul-88                                | 81.3      | 107  | 59.9 | 13.3 | 3.27 | 18.5 | 17.1 | 13.5 | 13.9 | 2.11 | 0.7   |
| 26-Jul-88                               | 209       | 301  | 163  | 30.7 | 7.95 | 39.3 | 35.5 | 24.9 | 21.1 | 2.35 | 0.73  |
| 16-Aug-88                               | 249       | 380  | 192  | 38.6 | 9.16 | 48.6 | 40.3 | 27.3 | 22.3 | 3.04 | 0.80  |
| 21-Sep-88                               | 70.7      | 68.1 | 45.8 | 10.5 | 2.72 | 16.2 | 15.6 | 12.3 | 11.6 | 1.77 | 0.53  |
| 24-Oct-88                               | 52        | 29.5 | 41.5 | 9.90 | 2.59 | 15.3 | 15.5 | 12.1 | 12.2 | 1.89 | 0.29  |
| 15-Nov-88                               |           |      |      |      |      |      |      |      |      |      |       |
| 20-Dec-88                               | 52.5      | 24.6 | 46.8 | 11.4 | 2.95 | 17.6 | 19.0 | 17.9 | 17.1 | 2.50 | 0.23  |
| 15-Feb-89                               | 51.7      | 25.4 | 46.0 | 10.6 | 2.78 | 16.5 | 18.3 | 15.6 | 16.3 | 2.46 | 0.25  |

## FLY.XLS

|                      |     |      |                                      |             |      |            |      |      |      |      |      |      |  |  |
|----------------------|-----|------|--------------------------------------|-------------|------|------------|------|------|------|------|------|------|--|--|
| fly.xls              |     |      | Fly River (Papua New Guinea) Estuary |             |      |            |      |      |      |      |      |      |  |  |
|                      |     |      |                                      | [Jan. 1994] |      |            |      |      |      |      |      |      |  |  |
| Sholkovitz (unpubl.) |     |      |                                      |             |      |            |      |      |      |      |      |      |  |  |
| 0.22 um filtrates    |     |      |                                      |             |      |            |      |      |      |      |      |      |  |  |
|                      |     |      |                                      |             |      |            |      |      |      |      |      |      |  |  |
| SAMPLE               | LAB | Sal  | La                                   | Ce          | Nd   | Sm         | Eu   | Gd   | Dy   | Er   | Yb   | Lu   |  |  |
|                      | #   |      |                                      |             |      |            |      |      |      |      |      |      |  |  |
| -                    | -   | -    | -                                    | -           | -    | [pmol/kg]* |      |      |      |      |      |      |  |  |
| Sta 605 (R)          | 562 | 0    | 108                                  | 252         | 178  | 50.3       | 13.9 | 55.5 | 39.6 | 18.6 | 13.6 | 1.70 |  |  |
| Sta 605 (R)          | 566 | 0.2  | 108                                  | 260         | 178  | 51.0       | 8.4  | 57.0 | 38.8 | 16.0 | 13.8 | 1.69 |  |  |
| Sta 610              | 568 | 2.6  | 14.4                                 | 38.2        | 27.5 | 10.1       | 2.2  | 13.2 | 8.36 | 4.95 | 4.21 | 0.59 |  |  |
| Sta 612              | 569 | 4.2  | 10.5                                 | 26.7        | 21.9 | 8.54       | 1.74 | 11.4 | 7.23 | 4.44 | 3.86 | 0.55 |  |  |
| Sta 613              | 575 | 5.1  | 10.3                                 | 18.8        | 20.1 | 8.05       | 1.54 | 10.7 | 6.67 | 4.24 | 3.60 | 0.57 |  |  |
| Sta 614              | 570 | 7.4  | 12.4                                 | 24.0        | 23.1 | 8.54       | 1.79 | 11.7 | 8.01 | 4.95 | 4.26 | 0.61 |  |  |
| Sta 616              | 571 | 10.3 | 11.6                                 | 19.9        | 21.6 | 8.31       | 1.69 | 11.4 | 7.63 | 5.01 | 4.24 | 0.60 |  |  |
| Sta 617              | 572 | 14.5 | 16.8                                 | 35.1        | 27.7 | 9.78       | 2.34 | 14.1 | 10.5 | 6.85 | 5.69 | 0.00 |  |  |
| Sta 620              | 573 | 21.0 | 18.5                                 | 29.7        | 29.3 | 10.5       | 2.37 | 15.2 | 11.4 | 7.47 | 6.07 | 0.85 |  |  |
| Sta 622              | 574 | 27.3 | 23.8                                 | 34.3        | 33.9 | 11.8       | 2.92 | 17.3 | 13.4 | 8.77 | 0.00 | 0.98 |  |  |
| Sta 589 (R)          | 561 | 34.7 | 25.1                                 | 34.9        | 38.6 | 12.2       | 3.30 | 19.3 | 15.8 | 10.5 | 8.32 | 1.14 |  |  |
| Sta 589 (R)          | 567 | 34.7 | 25.8                                 | 38.73       | 37.0 | 12.7       | 3.25 | 18.8 | 15.5 | 10.0 | 8.10 | 1.09 |  |  |
|                      |     |      |                                      |             |      |            |      |      |      |      |      |      |  |  |
|                      |     |      |                                      |             |      |            |      |      |      |      |      |      |  |  |
| R= replicates        |     |      |                                      |             |      |            |      |      |      |      |      |      |  |  |

[illegible]

|   | Sal   | La   | Ce   | Nd   | Sm   | Eu   | Gd   | Dy   | Er   | Yb   | Lu   |
|---|-------|------|------|------|------|------|------|------|------|------|------|
| <b>Tamar (Spring Tide) River [0.45 um filtrate]</b> |       |      |      |      |      |      |      |      |      |      |      |
|   | 0.02  |      | 239  | 260  | 62.8 | 15.4 | 70.6 | 47.3 | 30   | 30.6 | 5.63 |
|   | 0.02  | 182  | 269  | 268  | 64   | 15.4 | 66.1 | 47   | 28.9 | 30   | 5.01 |
|   | 0.02  | 173  | 258  | 241  | 57   | 13.7 | 62.4 | 39.9 | 24.7 | 27.3 | 4.31 |
|   | 0.04  |      | 307  | 212  | 49.7 | 11.8 |      | 34.4 | 22   | 24.6 | 4.27 |
|   | 4.2   | 73.9 | 83.1 | 81.4 | 20.4 | 5.19 | 26.7 | 18.9 | 13.4 |      | 3.33 |
|   | 6.95  | 61   | 70   | 67.3 | 17   | 4.36 | 22.4 | 14.4 | 11.9 | 23   | 3.28 |
|   | 9.25  | 56.4 | 60.7 | 58.5 | 14.4 | 3.73 | 21.5 | 11.4 | 10.7 | 12.4 | 2.61 |
|   | 12.6  | 60.8 | 51.4 | 52.6 | 12.6 | 3.24 | 22   | 11.8 | 9.65 | 12   | 2.03 |
|   | 16.5  | 55   | 40.2 | 45.8 | 10.6 | 2.72 | 23.6 | 12.1 | 9.13 | 11.6 | 2.21 |
|   | 19.6  | 39.4 | 25.2 | 33.5 | 7.78 | 2.04 | 11.2 | 9.94 | 6.45 |      | 1.48 |
|   | 22.8  | 40.8 |      | 35.2 | 8.13 | 2.1  | 13.4 | 8.44 | 7.23 | 9.43 | 1.4  |
| <b>Tamar (Neap Tides) [0.45 um filtrate]</b>        |       |      |      |      |      |      |      |      |      |      |      |
|   | 0.04  | 577  | 1010 | 914  | 238  | 59.5 | 255  | 174  | 98   | 95.2 | 15.6 |
|   | 0.043 | 540  | 368  | 614  | 162  | 40.5 | 191  | 116  | 75.6 |      | 13.4 |
|   | 0.044 | 480  | 497  | 779  | 203  | 50.6 | 220  | 145  | 79.5 | 73.6 | 12.1 |
|   | 0.049 |      | 640  | 854  | 218  | 53.6 |      | 150  | 82.8 | 84.5 | 12.7 |
|   | 0.064 | 400  |      |      | 319  | 74.4 | 333  | 204  | 93.6 |      | 14.1 |
|   | 11.2  | 130  | 158  | 132  | 30.3 | 7.33 | 34.3 |      | 19.4 | 17.4 | 2.9  |
|   | 18.7  | 55   | 60.6 | 58.1 | 13.8 | 3.43 | 14.8 | 15.3 | 10.2 | 15.5 | 1.72 |
|   | 21.6  |      | 36.5 | 41.9 | 9.86 | 2.52 | 12.8 | 9.97 | 8.27 | 9.45 | 1.58 |
|   | 25.6  | 39.1 | 33.7 | 41.7 | 9.13 | 2.32 | 11.2 | 8.78 | 7.94 | 8.91 | 1.57 |
| <b>Amazon River [0.45 um filtrate]</b>              |       |      |      |      |      |      |      |      |      |      |      |
|   | 0     | 355  | 847  | 570  | 145  | 35.3 | 185  | 121  | 65   | 52.2 | 6.93 |
|   | 4.16  | 1690 | 3820 | 1690 | 356  | 79.6 | 335  | 222  | 100  | 78.5 | 11.8 |
|   | 9.16  | 406  | 786  | 383  | 82.8 | 18.9 | 107  | 58   | 29   | 24.9 | 3.29 |

**Table A5: Section 6.1 of Handbook. Atlantic Ocean seawater**

File name: NdSm\_A.XLS. Concentration of Nd and Sm only for the Atlantic Ocean.

[illegible]

| Piepgras and Wasserburg (1987) |        |          |            |       |         |  |  |  |  |
|--------------------------------|--------|----------|------------|-------|---------|--|--|--|--|
| Map # 6                        |        |          |            | Depth | Nd      |  |  |  |  |
| Hudson                         | 83-036 | abrad    | Current    | 100m  | 32      |  |  |  |  |
| Hudson                         | 83-036 | Sta 9    |            | 5 m   | 25      |  |  |  |  |
|                                |        |          |            | 1200  | 18.2    |  |  |  |  |
|                                |        |          |            | 2550  | 20      |  |  |  |  |
| Hudson                         | 83-036 | ta. 11   |            | 5     | 21.1    |  |  |  |  |
|                                |        |          |            | 125   | 21.7    |  |  |  |  |
|                                |        |          |            | 500   | 19.2    |  |  |  |  |
|                                |        |          |            | 800   | 18.2    |  |  |  |  |
|                                |        |          |            | 1000  | 18.1    |  |  |  |  |
|                                |        |          |            | 1500  | 18.1    |  |  |  |  |
|                                |        |          |            | 2000  | 17.7    |  |  |  |  |
|                                |        |          |            | 2500  | 16.7    |  |  |  |  |
|                                |        |          |            | 3000  | 17.3    |  |  |  |  |
|                                |        |          |            | 3500  | 18.2    |  |  |  |  |
|                                |        |          |            | 3850  | 19.4    |  |  |  |  |
| Piepgras and Wasserburg (1987) |        |          |            |       | Map # 6 |  |  |  |  |
| TTO/NAS                        |        | Sta. 142 |            | 750   | 21.4    |  |  |  |  |
|                                |        | Sta. 144 |            | 65    | 14.3    |  |  |  |  |
|                                |        |          |            | 3750  | 16.3    |  |  |  |  |
|                                |        | Sta. 149 |            | 2800  | 16.8    |  |  |  |  |
|                                |        | Sta. 167 |            | 840   | 16.5    |  |  |  |  |
|                                |        |          |            | 2310  | 20.6    |  |  |  |  |
| All-109-1                      |        | Sta. 30  |            | 5     | 14.4    |  |  |  |  |
|                                |        |          |            | 200   | 13.6    |  |  |  |  |
|                                |        |          |            | 400   | 14.6    |  |  |  |  |
|                                |        |          |            | 600   | 14.6    |  |  |  |  |
|                                |        |          |            | 800   | 15.2    |  |  |  |  |
|                                |        |          |            | 1100  | 18      |  |  |  |  |
|                                |        |          |            | 1800  | 18.4    |  |  |  |  |
|                                |        |          |            | 3000  | 18.9    |  |  |  |  |
|                                |        |          |            | 4000  | 26.3    |  |  |  |  |
|                                |        |          |            | 4850  | 62.5    |  |  |  |  |
| All 109-1                      |        | Sta. 39  |            | 5     | 7.9     |  |  |  |  |
|                                |        | Sta. 79  |            | 5     | 9.29    |  |  |  |  |
|                                |        | Sta. 95  |            | 0     | 12.5    |  |  |  |  |
| OCE63                          |        | Sta. 1   |            | 300   | 13.9    |  |  |  |  |
|                                |        | Sta. 2   |            | 2000  | 17.8    |  |  |  |  |
|                                |        |          |            | 3400  | 22.1    |  |  |  |  |
| TTO/TAS                        |        | Sta. 63  | Chelex     | 0     | 18.2    |  |  |  |  |
|                                |        |          | Extraction | 200   | 15.2    |  |  |  |  |
|                                |        |          | data       | 390   | 15.5    |  |  |  |  |
|                                |        |          |            | 590   | 14.8    |  |  |  |  |
|                                |        |          |            | 790   | 15.9    |  |  |  |  |
|                                |        |          |            | 980   | 16.2    |  |  |  |  |
|                                |        |          |            | 1990  | 17.3    |  |  |  |  |
|                                |        |          |            | 2910  | 18.4    |  |  |  |  |
|                                |        |          |            | 3890  | 25.7    |  |  |  |  |
|                                |        |          |            | 4280  | 26.5    |  |  |  |  |
|                                |        |          |            | 4810  | 30.1    |  |  |  |  |

**Table A6: Section 6.1 of Handbook. Atlantic Ocean seawater**

File name: ASW\_CONC.XLS. Concentration of RE in the Atlantic Ocean.

File name: SARG\_DIS.XLS. Concentration of dissolved RE in the  
Sargasso Sea from Sholkovitz et al. (1994)

File name: SARG\_PAR.XLS. Concentration of suspended particles in the  
Sargasso Sea from Sholkovitz et al. (1994). Data on the chemical  
leaching of particles [acetic acid, strong mineral acid and  
bomb/strong acid dissolution]. Data in per kg of seawater

| Atlantic Ocean Seawater   |      |      |      |      |      |      |       |      |      |      |      |        |
|---|------|------|------|------|------|------|-------|------|------|------|------|--------|
| asw_conc.xls  |      |      |      |      |      |      |       |      |      |      |      |        |
| CONC = pmol/kg  |      |      |      |      |      |      |       |      |      |      |      |        |
| Depth   | La   | Ce   | Nd   | Sm   | Eu   | Gd   | Dy    | Er   | Yb   | Lu   |      | Ce/Ce* |
| -   | -    | -    | -    | -    | -    | -    | -     | -    | -    | -    |      | -      |
| <b>Sholkovitz &amp; Schneider (1991) Map # 3</b>                          |      |      |      |      |      |      |       |      |      |      |      |        |
| <b>Sta 10 (30 35'N &amp; 64 45'W)</b>                                     |      |      |      |      |      |      |       |      |      |      |      |        |
| 20  | 16.6 | 16.3 | 16.9 | 3.73 | 0.99 | 5.38 | 6.09  | 4.85 | 4.13 | 0.57 |      | 0.47   |
| 40  | 16.2 | 16.8 | 17.1 | 3.60 | 0.97 | 5.21 | 6.02  | 4.77 | 4.09 | 0.56 |      | 0.49   |
| 60  | 16.0 | 15.3 | 16.5 | 3.55 | 0.95 | 5.15 |       |      |      |      |      | 0.45   |
| 120   | 15.8 | 12.8 | 16.0 | 3.50 | 0.95 | 5.15 |       |      |      |      |      | 0.39   |
| 160   | 16.8 | 11.5 | 16.2 | 3.53 | 0.94 | 5.11 |       |      |      |      |      | 0.33   |
| 200   | 16.4 | 12.6 | 16.3 | 3.59 | 0.97 | 5.34 | 6.00  | 4.80 | 4.11 | 0.54 |      | 0.37   |
| <b>Sta 8 (31 46'N &amp; 64 12'W)</b>                                      |      |      |      |      |      |      |       |      |      |      |      |        |
| 15  | 16.0 | 15.7 | 15.9 | 3.51 | 0.92 | 5.33 | 5.84  | 4.74 | 4.04 | 0.55 |      | 0.47   |
| 15  | 15.7 | 15.1 | 17.6 | 4.55 | 0.93 | 6.07 |       |      |      |      |      | 0.44   |
| 30  | 15.5 | 15.0 | 15.6 | 3.49 | 0.92 | 5.12 | 6.02  | 4.71 | 4.07 | 0.56 |      | 0.46   |
| 45  | 15.5 | 14.0 | 16.0 | 3.50 | 0.93 | 5.10 |       |      |      |      |      | 0.43   |
| 60  | 15.7 | 13.5 | 15.5 | 3.46 | 0.91 | 5.07 | 5.86  | 4.77 | 4.15 | 0.57 |      | 0.41   |
| 105   | 14.9 | 12.1 | 15.5 | 3.46 | 0.94 | 5.27 | 5.89  | 4.77 | 4.12 | 0.56 |      | 0.38   |
| 200   | 15.4 | 10.8 | 15.9 | 3.48 | 0.88 | 5.27 | 5.86  | 4.75 | 4.08 | 0.56 |      | 0.33   |
| 255   | 15.5 | 11.1 | 16.8 | 4.18 | 0.90 | 5.83 | 5.83  | 4.77 | 4.09 | 0.56 |      | 0.33   |
| 340   | 15.3 | 9.6  | 16.2 | 3.95 | 0.87 | 5.57 | 5.59  | 4.58 | 3.98 | 0.53 |      | 0.29   |
| 440   | 15.4 | 8.2  | 15.2 | 3.29 | 0.88 | 4.80 | 5.47  | 4.56 | 3.97 | 0.55 |      | 0.25   |
| 550   | 16.9 | 6.3  |      |      |      |      |       |      |      |      |      | 0.28   |
| 750   | 20.5 | 5.1  | 16.0 | 3.27 |      | 7.28 | 5.15  | 4.45 | 4.20 | 0.52 |      | 0.13   |
| 1000  | 24.4 | 5.9  | 21.2 | 5.25 | 0.88 | 6.73 | 5.59  | 4.94 | 4.59 | 0.69 |      | 0.12   |
| 1500  | 26.0 | 6.8  | 21.4 | 5.41 | 0.89 | 6.85 | 5.71  | 5.08 | 4.76 | 0.70 |      | 0.13   |
| 2000  | 23.3 | 6.3  | 19.4 | 5.10 | 0.82 | 6.48 | 5.40  | 4.93 | 4.56 | 0.66 |      | 0.14   |
| 3000  | 24.8 | 5.8  | 20.8 | 5.27 | 0.87 | 6.78 | 5.80  | 4.99 | 4.68 | 0.69 |      |        |
| 4000  | 40.8 | 9.5  | 31.8 | 7.21 | 1.27 | 8.71 | 7.25  | 6.11 | 5.90 | 0.86 |      |        |
| <b>Elderfield &amp; Greaves (1982) Map #10</b>                            |      |      |      |      |      |      |       |      |      |      |      |        |
| <b>Sta 1B/79 (28 01'N &amp; 25 59'W)</b>                                  |      |      |      |      |      |      |       |      |      |      |      |        |
| 0   | 36.7 | 66.3 | 34.3 | 6.01 | 0.62 | 5.59 | 5.00  | 3.63 | 3.15 |      |      | 0.89   |
| 100   | 13.0 | 16.8 | 12.8 | 2.67 | 0.64 | 3.41 | 4.78  | 4.07 | 3.55 |      |      | 0.62   |
| 200   | 17.0 | 22.3 | 15.8 | 4.52 | 0.85 |      | 5.31  | 4.62 | 4.07 |      |      | 0.64   |
| 600   | 22.5 | 18.4 | 19.7 | 3.86 | 0.80 | 4.85 | 5.41  | 4.58 | 4.14 |      |      | 0.41   |
| 700   | 25.2 | 24.7 | 21.9 | 4.23 | 0.76 | 5.23 | 5.43  | 4.57 | 4.07 |      |      | 0.49   |
| 900   | 20.8 | 9.6  | 21.1 | 4.32 | 0.82 | 5.20 | 5.61  | 4.94 | 4.66 |      |      | 0.22   |
| 1000  |      | 20.8 | 22.8 | 4.51 | 1.01 |      | 6.00  |      |      |      |      | 1.22   |
| 1500  | 22.8 | 9.7  | 19.0 | 3.72 | 0.95 | 5.31 | 6.03  | 5.30 | 4.99 |      |      | 0.22   |
| 2500  | 29.4 | 26.1 | 25.0 | 4.75 | 0.90 | 7.19 | 6.10  | 5.09 | 4.79 |      |      | 0.45   |
| 3000  | 32.6 | 19.3 | 25.4 | 4.69 | 0.99 | 5.80 | 6.14  | 5.33 | 5.21 |      |      | 0.31   |
| 4500  | 54.4 | 55.1 | 45.8 | 8.25 | 1.22 | 8.27 | 6.830 | 5.34 | 5.16 |      |      | 0.51   |
| <b>DeBarr et. al. (1983) Map # 8 Sargasso Sea (33 58'N &amp; 58 05'W)</b> |      |      |      |      |      |      |       |      |      |      |      |        |
| Depth   | La   | Ce   | Pr   | Nd   | Sm   | Eu   | Tb    | Ho   | Tm   | Yb   | Lu   | Ce/Ce* |
| -   | -    | -    | -    | -    | -    | -    | -     | -    | -    | -    | -    | -      |
| 10  | 15.0 | 86   | 4.5  | 18.5 | 3.7  | 0.78 | 0.75  | 1.8  | 0.74 | 4.3  | 0.68 | 2.53   |
| 49  | 12.0 | 80   | 3.0  | 15.4 | 3.4  | 0.75 | 0.73  | 1.5  | 1.00 | 5.1  | 0.78 | 2.90   |
| 98  | 12.3 | 42   | 3.0  | 14.2 | 3.0  | 0.60 | 0.69  | 1.6  | 0.68 | 3.8  | 0.61 | 1.55   |
| 147   | 12.9 | 30   | 3.4  | 17.0 | 3.7  | 0.75 | 0.68  | 1.8  | 0.93 | 4.6  | 0.72 | 1.00   |
| 491   | 16.7 | 23   | 3.4  | 16.1 | 3.4  | 0.70 | 0.69  | 1.7  | 0.76 | 4.1  | 0.66 | 0.67   |

| Depth                         | La   | Ce    | Nd      | Sm   | Eu   | Gd   | Dy   | Er   | Yb   | Lu   |      | Ce/Ce* |
|-------------------------------|------|-------|---------|------|------|------|------|------|------|------|------|--------|
| 638                           | 17.8 | 18    | 4.1     | 16.2 | 3.2  | 0.65 | 0.68 | 1.5  | 0.62 | 3.9  | 0.64 | 0.50   |
| 783                           | 21.3 | 16    | 4.0     | 16.1 | 3.2  | 0.64 | 0.79 | 1.5  | 0.73 | 4.1  | 0.68 | 0.39   |
| 981                           | 22.2 | 15    | 4.0     | 17.2 | 3.5  | 0.73 | 0.77 | 1.9  | 0.95 | 5.1  | 0.85 | 0.35   |
| 1179                          | 27.2 | 23    | 5.3     | 19.1 | 3.6  | 0.76 | 0.82 | 1.9  | 0.88 | 4.9  | 0.82 | 0.45   |
| 1379                          | 26.2 | 15    | 4.1     | 14.9 | 2.8  | 0.60 | 0.67 | 1.8  | 0.66 | 3.7  | 0.83 | 0.32   |
| 1719                          | 26.2 | 14    | 3.8     | 15.4 | 3.1  | 0.65 | 0.65 | 1.2  | 0.70 | 3.9  | 0.88 | 0.30   |
| 2486                          |      |       | 7.2     | 20.4 | 3.3  | 0.72 | 0.78 | 1.6  | 0.89 | 5.0  | 1.10 |        |
| 2874                          |      | 20    | 5.3     | 18.8 | 3.5  | 0.80 | 0.80 | 1.6  | 0.90 | 5.2  | 1.17 | 1.42   |
| 3264                          | 46.6 | 16    | 4.6     | 21.4 | 4.5  | 1.04 | 0.97 | 2.0  | 1.03 | 6.1  | 1.36 | 0.20   |
| 4328                          | 83.8 | 44    | 10.7    | 40.8 | 7.9  | 1.67 | 1.57 | 2.7  | 1.27 | 7.3  | 1.59 | 0.31   |
| 4378                          | 80.8 | 44    | 10.4    | 39.4 | 7.6  | 1.66 | 1.53 | 2.6  | 1.21 | 7.4  | 1.59 | 0.32   |
| 4427                          | 82.2 | 55    | 10.3    | 39.8 | 7.8  | 1.65 | 1.40 | 2.5  | 1.14 | 7.0  | 1.54 | 0.39   |
|                               |      |       |         |      |      |      |      |      |      |      |      |        |
| German et. al. (1995)         |      |       | Map # 2 |      |      |      |      |      |      |      |      |        |
| Sta 47 (39 00.5'S &00 59.2'E) |      |       |         |      |      |      |      |      |      |      |      |        |
| Depth                         | La   | Ce    | Nd      | Sm   | Eu   | Gd   | Dy   | Er   | Yb   | Lu   |      | Ce/Ce* |
| 3                             | 10.8 | 5.56  | 7.92    | 1.44 | 0.39 | 2.28 | 2.95 | 2.74 | 2.19 | 0.34 |      | 0.27   |
| 40                            | 10.9 | 5.34  | 7.74    | 1.45 | 0.39 | 2.31 | 2.91 | 2.78 | 2.24 | 0.34 |      | 0.26   |
| 78                            | 10.8 | 5.58  | 7.97    | 1.48 | 0.40 | 2.43 | 2.97 | 2.84 | 2.32 | 0.35 |      | 0.27   |
| 118                           | 11.6 | 6.31  | 8.35    | 1.51 | 0.41 | 2.33 | 2.98 | 2.80 | 2.31 | 0.35 |      | 0.29   |
| 142                           | 11.0 | 5.22  | 8.01    | 1.48 | 0.40 | 3.02 | 2.38 | 2.88 | 2.41 | 0.37 |      | 0.25   |
| 166                           | 11.2 | 5.02  | 7.80    | 1.47 | 0.40 | 2.33 | 3.02 | 2.94 | 2.47 | 0.39 |      | 0.24   |
| 202                           | 12.3 | 5.58  | 8.94    | 1.74 | 0.47 | 2.67 | 3.39 | 3.22 | 2.79 | 0.44 |      | 0.24   |
| 241                           | 13.2 | 5.72  | 9.99    | 1.96 | 0.52 | 3.00 | 3.70 | 3.49 | 3.14 | 0.50 |      | 0.23   |
| 286                           | 14.7 | 5.97  | 10.7    | 2.08 | 0.56 | 3.12 | 4.00 | 3.82 | 3.53 | 0.57 |      | 0.22   |
| 331                           | 13.2 | 4.56  | 9.56    | 1.85 | 0.50 | 3.07 | 3.60 | 3.61 | 3.24 | 0.53 |      | 0.18   |
| 375                           |      | 3.99  | 9.93    | 1.92 | 0.56 | 3.09 | 3.82 | 3.68 |      | 0.53 |      |        |
| 418                           | 13.3 | 3.64  | 9.21    | 1.76 | 0.47 | 2.75 | 3.53 | 3.53 | 3.49 | 0.58 |      | 0.15   |
| 495                           | 15.3 | 3.38  | 10.2    | 1.94 | 0.53 | 3.38 | 3.93 | 3.98 | 4.00 | 0.67 |      | 0.12   |
| 565                           | 14.8 | 3.17  | 9.43    | 1.78 | 0.48 | 3.02 | 3.82 | 3.92 | 3.93 | 0.68 |      | 0.12   |
| 643                           | 16.0 | 2.98  | 10.4    | 1.94 | 0.53 | 3.17 | 4.03 | 4.31 | 4.29 | 0.72 |      | 0.10   |
| 741                           | 15.7 | 3.81  | 10.0    | 1.94 | 0.53 | 3.24 | 3.99 | 4.08 | 4.04 | 0.66 |      | 0.13   |
| 839                           | 17.0 | 3.56  | 10.5    | 1.96 | 0.54 | 3.23 | 4.12 | 4.24 | 4.43 | 0.75 |      | 0.12   |
| 936                           | 18.3 | 3.38  | 10.9    | 2.04 | 0.56 | 3.45 | 4.39 | 4.56 | 4.78 | 0.84 |      | 0.10   |
| 1082                          | 19.1 | 3.80  | 11.1    | 2.10 | 0.57 | 3.46 | 4.43 | 4.60 | 4.89 | 0.84 |      | 0.11   |
| 1273                          | 20.3 | 4.08  | 12.0    | 2.23 | 0.61 | 3.77 | 4.69 | 4.84 | 5.14 | 0.89 |      | 0.11   |
| 1466                          | 24.3 | 4.80  | 14.4    | 2.66 | 0.73 | 4.59 | 5.51 | 5.56 | 6.01 | 1.02 |      | 0.11   |
| 1657                          | 23.4 | 5.03  | 13.9    | 2.59 | 0.71 | 4.61 | 5.26 | 5.27 | 5.60 | 0.96 |      | 0.12   |
| 1841                          | 23.4 | 5.17  | 14.3    | 2.64 | 0.72 | 4.20 | 5.23 | 5.16 | 5.47 |      |      | 0.12   |
| 2088                          | 25.8 | 5.21  | 15.8    | 2.96 | 0.80 | 4.75 | 5.74 | 5.58 | 5.87 | 0.98 |      | 0.11   |
| 2332                          |      | 5.43  | 17.9    | 3.36 | 0.91 | 5.22 | 6.29 | 6.00 | 6.24 | 1.05 |      |        |
| 2581                          | 27.5 | 5.40  | 17.8    | 3.30 | 0.88 | 5.07 | 6.04 | 5.60 | 5.82 | 0.99 |      | 0.11   |
| 2832                          | 26.0 | 5.42  | 16.9    | 3.11 | 0.82 | 4.68 | 5.43 | 5.09 | 5.25 | 0.87 |      | 0.11   |
| 3082                          | 30.5 | 5.25  | 19.8    | 3.60 | 0.95 | 5.22 | 6.16 | 5.65 | 5.84 | 0.98 |      | 0.09   |
| 3330                          | 32.1 | 6.86  | 21.1    | 3.79 | 0.98 | 5.44 | 6.30 | 5.78 | 5.97 | 1.00 |      | 0.12   |
| 3532                          | 37.9 | 7.09  | 25.0    | 4.58 | 1.18 | 6.44 | 7.83 | 6.70 | 6.96 |      |      | 0.10   |
| 3737                          | 39.5 | 7.78  | 26.6    | 4.75 | 1.22 | 6.76 | 7.44 | 6.61 | 6.91 | 1.16 |      | 0.11   |
| 3945                          | 38.6 | 5.59  | 26.5    | 4.86 | 1.24 |      | 8.25 | 6.53 | 6.70 | 1.15 |      | 0.08   |
| 4202                          | 46.3 | 7.76  | 32.0    | 5.89 | 1.48 | 7.83 | 8.50 | 7.33 | 7.59 | 1.27 |      | 0.09   |
| 4458                          | 48.9 | 9.38  | 34.8    | 6.42 | 1.60 | 8.56 | 9.05 | 8.10 | 7.74 | 1.30 |      | 0.10   |
| 4700                          | 44.8 | 10.47 | 32.9    | 6.12 | 1.51 | 7.70 | 8.39 | 7.17 | 7.30 | 1.21 |      | 0.12   |
| 4995                          | 50.0 | 14.34 | 36.8    | 6.88 | 1.72 | 8.50 | 9.43 | 7.87 | 8.14 | 1.34 |      | 0.15   |

|                                 |              |               |   |           |             |           |           |           |           |           |           |                |                 |
|---------------------------------|--------------|---------------|---|-----------|-------------|-----------|-----------|-----------|-----------|-----------|-----------|----------------|-----------------|
| sarg-dis.xls                    |              |               |   |           |             |           |           |           |           |           |           |                |                 |
|                                 |              |               | <b>Sargasso Seawater - Dissolved Concentrations</b> |           |             |           |           |           |           |           |           |                |                 |
|                                 |              |               |   |           |             |           |           |           |           |           |           |                |                 |
| <b>Sholkovitz et al. (1994)</b> |              | <b>Map #3</b> |   |           |             |           |           |           |           |           |           |                |                 |
|                                 |              |               |   |           |             |           |           |           |           |           |           |                |                 |
|                                 |              |               |   |           | [pmol / Kg] |           |           |           |           |           |           |                |                 |
| <b>ID</b>                       | <b>DEPTH</b> | <b>La</b>     | <b>Ce</b>   | <b>Nd</b> | <b>Sm</b>   | <b>Eu</b> | <b>Gd</b> | <b>Dy</b> | <b>Er</b> | <b>Yb</b> | <b>Lu</b> | <b>Ce-Anom</b> | <b>Salinity</b> |
| -                               | -            | -             | -   | -         | -           | -         | -         | -         | -         | -         | -         | -              |                 |
| C-1                             | 15           | 16.0          | 15.7  | 15.9      | 3.5         | 0.92      | 5.3       | 5.8       | 4.7       | 4.0       | 0.55      | 0.64           | 36.6            |
| C-1R                            | 15           | 15.7          | 15.1  | 17.6      | 4.6         | 0.93      | 6.1       |           |           |           |           | 0.74           | 36.6            |
| C-2                             | 30           | 15.5          | 15.0  | 15.6      | 3.5         | 0.92      | 5.1       | 6.0       | 4.7       | 4.1       | 0.56      | 0.51           | 36.59           |
| C-3                             | 45           | 15.5          | 14.0  | 16.0      | 3.5         | 0.93      | 5.1       |           |           |           |           | 0.51           | 36.61           |
| C-4                             | 60           | 15.7          | 13.5  | 15.5      | 3.5         | 0.91      | 5.1       | 5.9       | 4.8       | 4.2       | 0.57      | 0.41           | 36.62           |
| C-7                             | 105          | 14.9          | 12.1  | 15.5      | 3.5         | 0.94      | 5.3       | 5.9       | 4.8       | 4.1       | 0.56      | 0.38           | 36.61           |
| C-11                            | 200          | 15.4          | 10.8  | 15.9      | 3.5         | 0.88      | 5.3       | 5.9       | 4.7       | 4.1       | 0.56      | 0.33           | 36.56           |
| C-12                            | 255          | 15.5          | 11.1  | 16.8      | 4.2         | 0.90      | 5.8       | 5.8       | 4.8       | 4.1       | 0.56      | 0.33           | 36.54           |
| C-13                            | 340          | 15.3          | 9.6   | 16.2      | 4.0         | 0.87      | 5.6       | 5.6       | 4.6       | 4.0       | 0.53      | 0.29           | 36.45           |
| C-14                            | 440          | 15.4          | 8.2   | 15.2      | 3.3         | 0.88      | 4.8       | 5.5       | 4.6       | 4.0       | 0.55      | 0.25           | 36.53           |
| C-15                            | 550          | 16.9          | 6.3   |           |             |           |           |           |           |           |           |                | 35.98           |
| C-17                            | 750          | 20.5          | 5.1   | 16.0      | 3.3         | 0.00      | 7.3       | 5.1       | 4.4       | 4.2       | 0.52      | 0.13           | 35.31           |
| C-19                            | 1000         | 24.4          | 5.9   | 21.2      | 5.3         | 0.88      | 6.7       | 5.6       | 4.9       | 4.6       | 0.69      | 0.12           | 35.06           |
| C-22                            | 1500         | 26.0          | 6.8   | 21.4      | 5.4         | 0.89      | 6.8       | 5.7       | 5.1       | 4.8       | 0.70      | 0.13           | 34.98           |
| C-20                            | 2000         | 23.3          | 6.3   | 19.4      | 5.1         | 0.82      | 6.5       | 5.4       | 4.9       | 4.6       | 0.66      | 0.14           | 34.98           |
| C-21                            | 3000         | 24.8          | 5.8   | 20.8      | 5.3         | 0.87      | 6.8       | 5.8       | 5.0       | 4.7       | 0.69      | 0.12           | 35.08           |
| C-23                            | 4000         | 40.8          | 9.5   | 31.8      | 7.2         | 1.27      | 8.7       | 7.2       | 6.1       | 5.9       | 0.86      | 0.12           | 34.9            |

## SARG\_PAR.XLS

|  |                               |           |           |           |                             |           |           |           |           |           |              |
|--|-------------------------------|-----------|-----------|-----------|-----------------------------|-----------|-----------|-----------|-----------|-----------|--------------|
| sarg_par.xls   |                               |           |           |           |                             |           |           |           |           |           |              |
|  | <b>Sargasso Sea Particles</b> |           |           |           |                             |           |           |           |           |           |              |
|  |                               |           |           |           |                             |           |           |           |           |           |              |
| <b>Sholkovitz et al. (1994)</b>                                    |                               |           |           |           |                             |           |           |           |           |           |              |
| <b>acetic acid digest (Ac); strong acid digest; HF bomb digest</b> |                               |           |           |           |                             |           |           |           |           |           |              |
| <b>SAMPLE</b>  | <b>La</b>                     | <b>Ce</b> | <b>Nd</b> | <b>Sm</b> | <b>Eu</b>                   | <b>Gd</b> | <b>Dy</b> | <b>Er</b> | <b>Yb</b> | <b>Lu</b> | <b>Ce</b>    |
| <b>Depth/Digest</b>  |                               |           |           |           | <b>[fmol / Kg seawater]</b> |           |           |           |           |           | <b>Anom.</b> |
| -----  |                               |           |           |           |                             |           |           |           |           |           |              |
| 60/Ac  | 194                           | 160       | 138       | 21.7      | 4.4                         | 21.4      | 13.8      | 12.6      | 4.4       | 0.12      | 0.44         |
| 105/Ac   | 393                           | 337       | 264       | 42.8      | 9.1                         | 37.4      | 21.5      | 10.0      | 5.2       | 0.35      | 0.47         |
| 150/Ac   | 368                           | 909       | 231       | 46.4      | 9.4                         |           | 26.5      | 10.6      | 6.3       | 0.50      | 1.6          |
| 200/Ac   | 319                           | 968       | 218       | 44.7      | 8.7                         | 38.3      | 27.0      | 13.2      | 7.4       | 0.74      | 1.64         |
| 255/Ac   | 375                           | 1083      | 233       | 44.9      | 11.2                        | 44.5      | 30.0      | 14.3      | 8.1       | 0.57      | 1.60         |
| 255/Strong   | 61                            | 244       | 69        | 18.6      | 4.7                         | 19.0      | 16.9      | 8.8       | 7.6       | 0.97      | 1.83         |
| 255/Bomb   | 147                           | 242       | 99        | 15.2      | 3.9                         | 11.5      | 9.3       | 5.6       | 5.2       | 0.51      | 0.90         |
| 340/Ac   | 343                           | 1123      | 267       | 52.5      | 12.1                        | 52.8      | 36.9      | 17.3      | 10.1      | 1.01      | 1.70         |
| 340/Strong   | 117                           | 395       | 111       | 27.6      | 6.3                         | 26.1      | 22.4      | 11.1      | 10.1      | 1.21      | 1.65         |
| 340/Bomb   | 203                           | 396       | 139       | 22.1      | 4.7                         | 15.8      | 13.4      | 7.6       | 7.3       | 0.96      | 1.05         |
| 750/Ac   | 352                           | 1183      | 308       | 61.9      | 12.5                        | 59.3      | 42.5      | 20.0      | 11.8      | 1.22      | 1.68         |
| 750/Strong   | 142                           | 609       | 183       | 42.2      | 9.7                         | 38.7      | 33.1      | 17.2      | 15.6      | 2.03      | 1.86         |
| 750/Bomb   | 294                           | 578       | 203       | 32.3      | 6.5                         | 22.7      | 18.5      | 10.8      | 10.5      | 1.27      | 1.06         |
| 1000/Ac  | 395                           | 1216      | 339       | 64.5      | 15.3                        | 61.0      | 45.3      | 22.9      | 11.6      |           | 1.55         |
| 1000/Strong  | 178                           | 585       | 195       | 43.6      | 9.6                         | 45.4      | 34.6      | 17.8      | 16.0      | 2.01      | 1.52         |
| 1000/Bomb  | 348                           | 620       | 229       | 36.8      | 7.5                         | 29.0      | 23.4      | 13.6      | 13.7      |           | 0.97         |
| 1500/Ac  | 437                           | 1306      | 400       | 80.0      | 17.6                        | 74.4      | 53.6      | 25.3      | 16.5      | 1.75      | 1.48         |
| 1500/Strong  | 166                           | 500       | 181       | 36.0      | 7.8                         | 31.7      | 25.6      | 13.1      |           |           | 1.40         |
| 1500/Bomb  | 315                           | 564       | 219       | 33.7      | 6.9                         | 23.8      | 20.8      | 12.1      | 11.8      | 1.63      | 0.96         |
| 2000/Ac  | 336                           | 995       | 321       | 64.0      | 13.8                        | 60.3      | 42.5      | 21.2      | 13.6      | 1.44      | 1.44         |
| 2000/Strong  | 164                           | 462       | 158       | 32.4      |                             | 48.3      | 22.4      | 11.4      | 9.6       | 1.18      | 1.36         |
| 2000/Bomb  | 380                           | 755       | 280       | 46.1      |                             |           | 26.8      | 15.9      | 16.0      | 1.98      | 1.05         |
| Blank/Ac   | 32                            | 35        | 23        | bd        | bd                          | bd        | 0.6       | 0.3       | bd        | bd        |              |
| Blank/Strong   | bd                            | 33        | 16        | bd        | bd                          | bd        | 0.4       | 0.4       | bd        | bd        |              |
| Blank/Bomb   | 33                            | 26        | 16        | 2         | bd                          | bd        | 0.7       | 0.7       | bd        | bd        |              |

**Table A7: Handbook section 6.1. Pacific Ocean seawater**

File name: PSW\_CONC.XLS. Concentration of RE in Pacific Ocean  
seawater

|                             |      |      |      |      | Pacific Ocean Seawater |      |       |                          |       |      |      |        |  |  |
|-----------------------------|------|------|------|------|------------------------|------|-------|--------------------------|-------|------|------|--------|--|--|
| psw_conc.xls                |      |      |      |      |                        |      |       |                          |       |      |      |        |  |  |
|                             |      |      |      |      | CONC = pmol/kg         |      |       |                          |       |      |      |        |  |  |
| Depth                       | La   | Ce   | Nd   | Sm   | Eu                     | Gd   | Dy    | Er                       | Yb    | Lu   |      | Ce/Ce* |  |  |
|                             |      |      |      |      |                        |      |       |                          |       |      |      |        |  |  |
| Piepgrass & Jacobsen (1992) |      |      |      |      | Map #16                |      |       |                          |       |      |      |        |  |  |
| TPS 47 39-1                 |      |      |      |      |                        |      |       |                          |       |      |      |        |  |  |
| 3                           | 22.6 | 8.0  | 15.9 | 2.88 | 0.75                   | 4.01 | 4.65  | 4.22                     | 3.52  | 0.61 |      | 0.19   |  |  |
| 195                         | 36.3 | 6.4  | 22.2 | 4.09 | 1.06                   | 5.84 | 6.72  | 6.13                     | 6.00  | 1.07 |      | 0.10   |  |  |
| 364                         | 40.2 | 6.1  | 22.9 | 4.12 | 1.12                   | 5.94 | 7.05  | 6.86                     | 6.80  | 1.22 |      | 0.09   |  |  |
| 600                         | 42.0 | 7.7  | 24.4 | 4.52 | 1.17                   | 6.62 | 7.89  | 7.57                     | 7.84  | 1.42 |      | 0.10   |  |  |
| 800                         | 43.1 | 6.2  | 25.3 | 4.70 | 1.24                   | 6.90 | 8.16  | 8.08                     | 8.38  | 1.53 |      | 0.08   |  |  |
| 1249                        | 45.1 | 5.9  | 27.3 | 5.07 | 1.36                   | 7.97 | 9.12  | 9.04                     | 9.51  | 1.72 |      | 0.07   |  |  |
| 1795                        | 48.4 | 6.2  | 29.8 | 5.54 | 1.47                   | 8.56 | 10.2  | 9.88                     | 10.8  | 1.96 |      | 0.07   |  |  |
| 2692                        | 53.7 | 5.6  | 34.2 | 6.39 | 1.71                   | 9.22 | 10.9  | 10.3                     | 11.3  | 2.01 |      | 0.06   |  |  |
| 3592                        | 57.8 | 5.6  | 38.7 | 7.31 | 1.92                   | 10.5 | 11.8  | 10.6                     | 11.3  | 2.03 |      | 0.05   |  |  |
| 4481                        | 60.1 | 6.0  | 42.9 | 8.14 | 2.11                   | 11.3 | 12.1  | 10.6                     | 11.2  | 1.98 |      | 0.05   |  |  |
| 5408                        | 61.6 | 8.4  | 44.4 | 8.60 | 2.20                   | 11.7 | 12.4  | 10.5                     | 11.1  | 1.97 |      | 0.07   |  |  |
| TPS 47 80-1                 |      |      |      |      |                        |      |       |                          |       |      |      |        |  |  |
| 5174                        | 79.5 | 13.0 | 62.8 | 12.6 | 3.2                    | 15.8 | 16.8  | 13.5                     | 14.0  | 2.44 |      | 0.08   |  |  |
| TPS 24 76-1                 |      |      |      |      |                        |      |       |                          |       |      |      |        |  |  |
| 4621                        | 68.4 | 5.5  | 51.7 | 10.2 | 2.5                    | 13.7 | 13.9  | 11.7                     | 12.3  | 2.13 |      | 0.04   |  |  |
| TPS 24 271-1                |      |      |      |      |                        |      |       |                          |       |      |      |        |  |  |
| 0                           | 5.8  | 5.0  | 5.4  | 1.14 | 0.32                   | 1.75 | 2.10  | 1.78                     | 1.34  | 0.21 |      | 0.42   |  |  |
| 184                         | 7.8  | 4.9  | 6.8  | 1.43 | 0.40                   | 2.21 | 2.70  | 2.32                     | 1.92  | 0.31 |      | 0.31   |  |  |
| 381                         | 10.1 | 3.4  | 7.9  | 1.65 | 0.47                   | 2.63 | 3.22  | 2.81                     | 2.27  |      |      | 0.18   |  |  |
| 640                         | 24.1 | 3.3  | 15.1 | 2.85 | 0.77                   | 4.47 | 5.16  | 4.76                     | 4.46  | 0.81 |      | 0.08   |  |  |
| 1046                        | 35.3 | 4.1  | 20.0 | 3.65 | 0.99                   | 5.77 | 6.78  | 6.66                     | 6.88  |      |      | 0.07   |  |  |
| 1194                        | 36.3 | 3.8  | 20.9 | 3.80 | 1.04                   | 5.94 | 7.23  | 7.11                     | 7.57  | 1.32 |      | 0.06   |  |  |
| 2000                        | 46.9 | 4.0  | 28.2 | 5.13 | 1.40                   | 7.75 | 9.41  | 9.21                     | 9.97  | 1.84 |      | 0.05   |  |  |
| 2999                        | 53.7 | 4.7  | 34.9 | 6.36 | 1.72                   | 9.32 | 10.8  | 9.97                     | 10.70 | 1.93 |      | 0.05   |  |  |
| 4195                        | 54.8 | 5.0  | 37.0 | 6.84 | 1.80                   | 9.52 | 10.8  | 9.73                     | 10.50 | 2.05 |      | 0.05   |  |  |
| 5073                        | 52.7 | 5.7  | 35.0 | 6.54 | 1.71                   | 9.21 | 10.1  | 9.19                     | 9.80  | 1.81 |      | 0.06   |  |  |
| TPS 24 351-1                |      |      |      |      |                        |      |       |                          |       |      |      |        |  |  |
| 5926                        | 52.9 | 5.0  | 34.5 | 6.39 | 1.69                   | 9.04 | 10.20 | 9.32                     | 9.96  | 1.78 |      | 0.05   |  |  |
| Klinkhammer, et. al. (1983) |      |      |      |      | Map # 19               |      |       |                          |       |      |      |        |  |  |
| SE Pacific                  |      |      |      |      |                        |      |       |                          |       |      |      |        |  |  |
| 0                           | 4.9  | 3.1  | 3.4  | 0.56 | 0.20                   | 1.10 | 1.30  | 1.20                     | 0.79  |      |      | 0.34   |  |  |
| 2500                        | 30.0 | 3.5  | 16.0 | 2.70 | 0.80                   | 5.00 | 6.30  | 7.00                     | 7.50  |      |      | 0.07   |  |  |
| NW Pacific                  |      |      |      |      |                        |      |       |                          |       |      |      |        |  |  |
| 0                           | 8.3  | 10.0 | 5.1  | 1.00 | 0.33                   | 1.60 | 2.00  | 1.70                     | 1.10  |      |      | 0.67   |  |  |
| 2500                        | 47.0 | 9.0  | 30.0 | 5.30 | 1.40                   | 8.20 | 9.70  | 9.40                     | 8.00  |      |      | 0.11   |  |  |
| DeBaar et. al. (1985)       |      |      |      |      | Map # 18               |      |       | Vertex II (18 N & 108 W) |       |      |      |        |  |  |
| Depth                       | La   | Ce   | Pr   | Nd   | Sm                     | Eu   | Gd    | Tb                       | Ho    | Tm   | Yb   | Lu     |  |  |
| 15                          | 19   | 11.0 | 3.2  | 13   | 2.7                    | 0.70 | 4.0   | 0.54                     | 0.97  | 0.35 | 2.2  | 0.35   |  |  |
| 45                          | 22   | 10.0 | 3.5  | 16   | 2.8                    | 0.69 | 3.7   | 0.56                     | 0.71  | 0.40 | 1.9  | 0.30   |  |  |
| 100                         | 32   | 10.0 | 3.3  | 15   | 2.6                    | 0.76 | 4.0   | 0.58                     | 0.83  | 0.52 | 2.8  | 0.44   |  |  |
| 150                         | 47   | 25.0 | 4.3  | 24   | 4.0                    | 1.23 | 6.3   | 0.91                     | 1.50  | 0.86 | 5.8  | 0.96   |  |  |
| 200                         | 17   | 17.0 | 2.5  | 13   | 2.6                    | 0.71 | 3.7   | 0.55                     | 1.11  | 0.57 | 3.5  | 0.60   |  |  |
| 300                         | 19   | 18.0 | 3.0  | 15   | 2.6                    | 0.77 | 4.3   | 0.61                     | 1.02  | 0.57 | 3.7  | 0.63   |  |  |
| 400                         | 22   | 13.0 | 2.3  | 14   | 2.6                    | 0.71 | 4.0   | 0.54                     | 1.20  | 0.62 | 4.0  | 0.68   |  |  |
| 500                         | 20   | 13.0 | 3.1  | 15   | 2.5                    | 0.75 | 4.2   | 0.58                     | 1.50  | 0.66 | 4.0  | 0.71   |  |  |
| 750                         | 34   | 8.4  | 4.2  | 17   | 3.1                    | 0.82 | 4.1   | 0.70                     | 1.40  | 0.78 | 5.5  | 0.98   |  |  |
| 1000                        | 35   | 7.4  | 7.6  | 34   | 6.4                    | 1.56 | 8.6   | 1.41                     | 3.52  | 1.84 | 13.2 | 2.44   |  |  |
| 1250                        | 33   | 4.2  | 4.5  | 25   | 4.5                    | 1.25 | 7.1   | 1.13                     | 2.36  | 1.50 | 9.1  | 1.63   |  |  |
| 1750                        | 49   | 4.2  | 7.4  | 27   | 6.0                    | 1.47 | 8.6   | 1.33                     | 3.30  | 1.90 | 13.0 | 2.40   |  |  |
| 2000                        | 46   | 5.3  | 5.6  | 24   | 5.2                    | 1.30 | 7.2   | 1.12                     | 2.80  | 1.50 | 11.0 | 2.00   |  |  |
| 2250                        | 67   | 3.3  | 8.5  | 33   | 6.7                    | 1.68 | 9.4   | 1.47                     | 3.75  | 2.00 | 14.0 | 2.60   |  |  |
| 2750                        | 63   | 2.9  | 8.9  | 42   | 9.0                    | 2.32 | 13.0  | 2.01                     | 4.40  | 2.50 | 17.0 | 3.10   |  |  |
| 3000                        | 51   | 3.4  | 9.2  | 49   | 8.8                    | 2.43 | 13.0  | 2.11                     | 4.80  | 2.40 | 15.0 | 2.70   |  |  |
| 3250                        | 67   | 2.9  | 7.0  | 41   | 7.7                    | 2.15 | 12.0  | 1.81                     | 4.00  | 1.95 | 13.0 | 2.30   |  |  |
|                             |      |      |      |      |                        |      |       |                          |       |      |      |        |  |  |
|                             |      |      |      |      |                        |      |       |                          |       |      |      |        |  |  |
|                             |      |      |      |      |                        |      |       |                          |       |      |      |        |  |  |

| Zhang, et. al. (1994)       |        |       |      | Map # 12 |      |      |       |       |       |      |      |      |      |      |
|-----------------------------|--------|-------|------|----------|------|------|-------|-------|-------|------|------|------|------|------|
| Depth                       | La     | Ce    | Pr   | Nd       | Sm   | Eu   | Gd    | Tb    | Dy    | Ho   | Er   | Tm   | Yb   | Lu   |
| 0                           | 4.72   |       | 1.25 | 4.99     | 1.16 | 0.32 | 1.76  | 0.33  | 2.45  | 0.64 | 2.03 | 0.27 | 1.59 | 0.23 |
| 25                          | 3.28   |       | 0.78 | 3.70     | 1.11 | 0.30 | 1.58  | 0.32  | 2.33  | 0.62 | 1.99 | 0.26 | 1.45 | 0.22 |
| 99                          |        |       |      |          | 1.43 | 0.30 |       | 0.38  | 2.26  | 0.62 | 2.05 | 0.28 | 1.61 | 0.25 |
| 199                         | 4.65   |       | 0.90 | 3.57     | 1.10 | 0.30 | 1.66  | 0.32  | 2.45  | 0.66 | 2.09 | 0.29 | 1.55 | 0.24 |
| 397                         | 5.95   |       | 1.46 | 5.81     | 1.35 | 0.37 | 2.05  | 0.38  | 2.91  | 0.79 | 2.63 | 0.36 | 2.13 | 0.34 |
| 695                         | 15.98  |       | 3.75 | 16.1     | 2.72 | 0.70 | 4.13  | 0.73  | 5.42  | 1.49 | 4.92 | 0.71 | 4.58 | 0.75 |
| 993                         | 21.94  |       | 3.71 | 15.7     | 3.39 | 0.93 | 5.10  | 0.96  | 7.04  | 1.98 | 6.70 | 1.00 | 6.58 | 1.15 |
| 1486                        | 26.28  |       | 4.03 | 18.7     | 3.91 | 1.08 | 6.01  | 1.07  | 8.17  | 2.32 | 8.00 | 1.18 | 7.98 | 1.40 |
| 1980                        |        |       |      |          | 4.52 | 1.18 | 7.74  | 1.24  | 9.26  | 2.60 | 9.07 | 1.38 | 9.47 | 1.64 |
| 2472                        | 30.19  |       | 5.01 | 22.1     | 5.09 | 1.39 | 7.35  | 1.31  | 9.88  | 2.74 | 9.30 | 1.41 | 9.42 | 1.63 |
| 2963                        | 33.53  |       | 6.13 | 25.7     | 5.41 | 1.43 | 7.81  | 1.42  | 10.6  | 2.94 | 10.0 | 1.52 | 10.3 | 1.79 |
| 3453                        | 35.06  |       | 7.43 | 32.5     | 6.49 | 1.67 | 9.13  | 1.58  | 11.5  | 3.07 | 10.1 | 1.49 | 10.1 | 1.72 |
| Esser, et. al. (1994)       |        |       |      | Map # 15 |      |      |       |       |       |      |      |      |      |      |
| Depth                       | La     | Ce    |      | Nd       | Sm   | Eu   | Gd    |       |       |      | Er   |      | Yb   |      |
| 0                           | 9.6    | 13.6  |      | 11.4     | 4    | 0.92 | 4.5   |       |       |      | 2.8  |      | 2.4  |      |
| Tanaka, et. al. (1990)      |        |       |      | Map # 17 |      |      |       |       |       |      |      |      |      |      |
|                             | Depth  | La    | Ce   | Nd       | Sm   | Eu   | Gd    | Dy    | Er    | Yb   | Lu   |      |      |      |
| FK                          | 110    | 69.0  | 115  | 53.1     | 8.60 | 2.38 | 12.7  | 12.5  | 8.43  | 7.29 | 1.16 |      |      |      |
| KT                          | bottom | 5.4   | 20.9 | 6.0      | 1.23 | 0.36 | 3.64  | 2.37  | 2.47  | 2.27 | 0.40 |      |      |      |
| KG 1 SW                     | 0      | 65.0  | 67.1 | 50.5     | 9.08 | 2.41 | 13.4  | 12.5  | 9.97  | 8.06 | 1.34 |      |      |      |
| KG 1 BW                     | 40     | 68.0  | 159  | 55.6     | 10.0 | 2.58 | 16.5  | 12.2  | 8.64  | 7.51 | 1.25 |      |      |      |
| SM 1 SW                     | 0      | 112.3 | 134  | 75.7     | 9.37 | 2.70 | 18.1  | 15.3  | 11.07 | 8.86 | 1.49 |      |      |      |
| SM 1 BW                     | 60     | 87.6  | 138  | 65.3     | 10.1 | 2.49 | 19.8  | 12.4  | 8.47  | 7.71 | 1.24 |      |      |      |
| SG 1 SW                     | 0      | 86.4  | 99.7 | 55.8     | 7.27 | 1.95 | 12.9  | 11.1  | 8.26  | 7.20 | 1.17 |      |      |      |
| SG 1 BW                     | 40     | 62.5  | 140  | 52.0     | 9.78 | 2.56 | 16.0  | 11.0  | 7.46  | 6.46 | 1.04 |      |      |      |
| SG 2 SW                     | 0      | 49.7  | 74.3 | 39.8     | 7.66 | 1.86 | 19.0  | 11.0  | 8.34  | 7.53 | 1.24 |      |      |      |
| SG 2 BW                     | 40     | 69.6  | 138  | 57.3     | 10.0 | 2.43 | 12.1  | 11.4  | 7.64  | 6.94 | 1.08 |      |      |      |
| SG 3 SW                     | 0      | 57.7  | 94.2 | 50.4     | 9.48 | 2.35 | 16.6  | 13.3  | 9.97  | 8.62 | 1.37 |      |      |      |
| SG 3 BW                     | 75     | 37.8  | 91.9 | 42.8     | 7.97 | 2.09 | 17.4  | 9.81  | 6.97  | 6.64 | 1.06 |      |      |      |
| SG 4 SW                     | 0      | 57.5  | 84.5 | 45.7     | 7.87 | 1.93 | 14.8  | 11.8  | 9.39  | 8.53 | 1.43 |      |      |      |
| SG 4 BW                     | 70     | 59.8  | 126  | 50.0     | 9.08 | 2.30 | 13.0  | 11.00 | 7.64  | 6.66 | 1.12 |      |      |      |
| HW-1                        | 1675   | 27.43 | 7.93 | 19.6     | 3.85 | 1.10 | 5.25  | 4.70  | 3.43  | 3.04 | 0.47 |      |      |      |
| S-2                         | 4233   | 47.7  | 47.9 | 34.8     | 6.74 | 1.79 | 8.41  | 8.57  | 6.51  | 6.20 | 1.01 |      |      |      |
| KS-3                        | 5022   | 49.8  | 33.3 | 46.9     | 9.55 | 2.52 | 11.6  | 10.9  | 7.24  | 6.53 | 0.99 |      |      |      |
|                             | Depth  | La    | Ce   | Nd       | Sm   | Eu   | Gd    | Dy    | Er    | Yb   | Lu   |      |      |      |
| KS4(u)-1                    | 3395   | 36.1  | 15.1 | 30.2     | 6.19 | 1.59 | 8.31  | 7.16  | 4.65  | 4.07 | 0.60 |      |      |      |
| KS4(L)-1                    | 3495   | 37.6  | 18.6 | 31.9     | 6.54 | 1.80 | 7.77  | 7.00  | 4.29  | 3.69 | 0.54 |      |      |      |
| KS5(u)-1                    | 4945   | 49.1  | 26.9 | 39.4     | 8.05 | 2.05 | 9.32  | 8.74  | 5.57  | 4.93 | 0.72 |      |      |      |
| KS5(l)-1                    | 5045   | 58.2  | 29.0 | 47.9     | 9.99 | 2.63 | 12.85 | 12.67 | 9.30  | 8.58 | 1.20 |      |      |      |
| Shimizu, et. al. (1994)     |        |       |      | Map # 14 |      |      |       |       |       |      |      |      |      |      |
| DE-4 (44 40' N & 177 00' W) |        |       |      |          |      |      |       |       |       |      |      |      |      |      |
| 0                           | 9.9    | 32.8  |      | 11.5     |      |      | 2.94  | 3.56  | 2.74  | 2.35 | 0.28 |      |      |      |
| 50                          | 12.4   | 31.3  |      | 12.6     | 2.29 | 0.64 | 3.21  | 3.44  | 3.00  | 3.01 | 0.46 |      |      |      |
| 100                         | 13.2   | 19.7  |      | 15.3     | 2.99 | 0.83 | 3.94  | 4.93  | 3.37  | 3.05 | 0.52 |      |      |      |
| 200                         | 20.7   | 26.1  |      | 23.5     | 4.89 | 1.51 | 5.69  | 7.50  | 6.08  | 6.04 | 1.05 |      |      |      |
| 300                         | 15.8   | 26.1  |      | 18.6     | 3.98 |      | 5.04  | 5.29  | 4.36  | 3.97 | 0.75 |      |      |      |
| 498                         | 13.4   | 9.3   |      | 11.6     | 2.39 | 0.67 | 3.69  | 4.14  | 3.52  | 3.56 | 0.66 |      |      |      |
| 997                         | 25.3   | 18.2  |      | 21.6     | 4.42 | 1.26 | 6.34  | 8.72  | 6.12  | 6.48 | 1.11 |      |      |      |
| 1494                        | 28.4   | 24.3  |      | 28.8     | 5.91 | 1.71 | 8.20  | 9.37  | 8.62  | 9.13 | 1.57 |      |      |      |
| 1991                        | 23.4   |       |      | 22.5     | 4.61 | 1.21 | 6.31  | 7.10  | 6.43  | 6.91 | 1.2  |      |      |      |
| 2588                        | 23.5   | 15.7  |      | 21.2     | 4.75 | 1.40 | 6.45  |       | 7.75  | 8.25 | 1.47 |      |      |      |
| 3750                        | 24.6   | 19.9  |      | 29.4     | 5.99 | 1.74 | 8.45  | 9.33  | 8.33  | 8.62 | 1.51 |      |      |      |
| 4436                        | 23.3   | 14.1  |      | 30.0     | 6.36 | 1.83 | 9.49  | 9.10  | 7.25  | 7.99 | 1.41 |      |      |      |
| 5188                        | 22.7   | 14.8  |      | 30.1     | 6.86 | 1.87 | 8.76  | 8.59  | 6.78  | 7.05 | 1.27 |      |      |      |
| 5809                        | 25.1   | 12.4  |      | 29.8     | 6.40 | 1.86 |       |       | 6.48  | 7.03 | 1.17 |      |      |      |

[illegible]

**Table A8: Handbook section 6.1. Indian Ocean seawater**

File name: IND\_CONC.XLS. Concentration of RE in Indian Ocean  
seawater

|   |       |      |       | Indian Ocean   |       |      |      |          |      |       |
|---|-------|------|-------|----------------|-------|------|------|----------|------|-------|
| ind_conc.xls  |       |      |       |                |       |      |      |          |      |       |
|   |       |      |       |                |       |      |      |          |      |       |
|   |       |      |       | CONC = pmol/kg |       |      |      |          |      |       |
| Depth   | La    | Ce   | Nd    | Sm             | Eu    | Gd   | Dy   | Er       | Yb   | Lu    |
| -   | -     | -    | -     | -              | -     | -    | -    | -        | -    | -     |
| 1. Filtered Water Samples [0.4 um filtrates]            |       |      |       |                |       |      |      |          |      |       |
|   |       |      |       |                |       |      |      |          |      |       |
| Bertram & Elderfield (1993); German & Elderfield (1990) |       |      |       |                |       |      |      | Map # 22 |      |       |
| CD-1501 (05 14.9'S & 55 02.2'E)                         |       |      |       |                |       |      |      |          |      |       |
| 202   | 15.2  | 8.0  | 10.9  | 2.14           | 0.60  | 3.47 | 4.09 | 3.73     | 3.55 | 0.60  |
| 936   | 24.0  | 4.8  | 14.9  | 2.93           | 0.83  | 4.77 | 5.61 | 5.26     | 5.42 | 0.96  |
| 1500  | 27.3  | 5.5  | 17.1  | 3.29           | 0.90  |      | 6.48 | 6.05     | 6.25 | 1.57  |
| 1953  | 29.0  | 7.0  | 20.9  | 3.95           | 1.07  | 6.70 | 7.12 | 6.85     | 7.37 | 1.27  |
| 2499  |       | 4.9  | 23.3  | 4.25           | 1.17  |      | 7.74 | 7.19     | 7.67 |       |
| 2878  | 39.7  | 6.0  | 24.7  | 4.43           | 1.18  | 7.59 | 7.25 |          | 8.54 | 1.51  |
| 2950  |       |      | 27.5  | 5.05           | 1.35  | 7.50 | 8.56 | 7.89     | 8.46 | 1.31  |
| CD-1502 (12 17.8'S & 53 41.4'E)                         |       |      |       |                |       |      |      |          |      |       |
| 10  | 8.14  | 7.35 | 6.93  | 1.43           | 0.43  | 2.34 | 2.34 | 2.47     | 1.93 | 0.29  |
| 25  | 8.38  | 4    | 6.97  | 1.47           | 0.43  | 2.41 | 3.02 | 2.64     | 1.92 | 0.291 |
| 49  | 8.4   | 5.43 | 6.91  | 1.45           | 0.44  | 2.32 | 2.9  | 2.64     | 1.94 | 0.29  |
| 70  |       | 8.43 | 8.16  | 0              | 2.52  | 3.22 | 2.75 | 2.17     | 2.17 | 0.35  |
| 72  | 9.6   | 5.01 | 7.42  | 1.54           | 0.46  | 2.54 | 3.29 | 3        | 2.54 | 0.419 |
| 83  | 9.57  | 4.6  | 7.67  | 1.5            | 0.41  | 2.7  | 3.27 | 3.11     | 2.7  | 0.457 |
| 94  | 10.41 | 4.74 | 7.82  | 1.61           | 0.49  | 2.6  | 3.42 | 3.15     | 2.85 | 0.475 |
| 108   |       | 4.63 | 8     | 1.66           | 0.495 | 2.81 | 3.54 | 3.26     | 2.98 | 0.49  |
| 120   | 11.31 | 4.2  | 8.46  | 1.75           | 0.512 | 2.9  | 3.67 | 3.4      | 3.08 | 0.52  |
| 125   |       | 5.04 |       | 1.67           |       |      |      | 3.21     |      | 0.58  |
| 160   | 10.34 | 3.82 | 8.02  | 1.66           | 0.49  | 2.75 | 3.47 | 3.21     | 2.78 | 0.48  |
| 231   | 9.9   |      | 8.12  | 1.64           | 0.472 | 2.7  | 3.38 | 3.22     | 2.98 | 0.45  |
| 300   | 11.33 | 2.84 | 8.26  | 1.69           | 0.49  |      | 3.46 | 3.44     | 3.13 |       |
| 500   |       | 2.71 | 9.69  | 1.93           | 0.55  | 3.25 | 3.92 | 3.9      | 3.8  |       |
| 600   | 16.24 | 2.32 | 10.84 | 2.14           | 0.61  | 3.51 | 4.31 | 4.2      | 4.26 | 0.74  |
| 600   |       | 3.33 | 11.07 | 2.13           | 0.606 |      | 4.89 |          | 4.25 | 0.77  |
| 700   | 18.38 | 2.92 | 11.77 | 2.35           |       | 4.34 | 4.47 | 4.7      | 4.61 | 0.81  |
| 730   |       | 2.75 | 12.15 | 2.41           | 0.66  |      |      | 4.79     | 4.4  | 1.08  |
| 900   | 24    |      | 14.02 | 2.68           | 0.77  | 4.23 | 5.17 | 4.97     | 5.14 | 0.9   |
| 901   | 21.7  | 3.3  | 13.8  | 2.67           | 0.766 |      | 5.13 | 5.03     | 5.16 | 0.93  |
| 1151  | 24.26 | 4.1  | 15.21 | 2.93           | 0.826 | 4.67 | 5.54 | 5.64     | 5.76 | 1.03  |
| 1195  |       |      | 18.7  | 3.19           |       |      | 6.4  |          |      |       |
| 1502  | 28.5  | 4.33 | 16.84 | 3.19           | 0.903 | 5.21 | 6.12 | 6.03     | 6.5  | 1.18  |
| 1750  | 30.63 | 4.38 | 18.93 | 3.42           | 0.912 | 5.44 | 6.72 | 6.38     | 6.81 | 1.35  |
| 2001  | 33.11 | 4.44 | 19.91 | 3.72           | 1.01  | 5.7  | 6.86 | 6.61     | 7.01 | 1.27  |
| 2500  | 38.05 | 5.2  | 23.34 | 4.22           | 1.17  | 6.4  | 7.59 | 7.19     | 7.71 | 1.38  |
| 2701  | 40.78 |      | 23.95 | 4.32           | 1.15  | 6.51 | 7.59 | 7.18     | 7.75 | 1.36  |
| 3000  | 41.64 | 5.99 | 25.88 | 4.73           | 1.28  | 6.79 | 8.1  | 7.54     | 8.1  | 1.49  |
| 3250  | 38.64 | 5.81 | 26.32 | 4.8            | 1.32  | 7.35 | 8.25 | 7.78     | 8.31 | 1.61  |
| 3500  | 44    | 5.94 | 27.16 | 4.94           | 1.27  | 6.97 | 8.14 | 7.49     | 7.9  | 1.45  |
| 3750  | 43.45 | 6.19 | 27.95 | 5.1            | 1.35  | 7.32 | 8.37 | 7.7      | 8.02 | 1.45  |
| 4002  | 43.1  | 5.18 | 28.13 | 5.11           | 1.35  | 7.11 | 8.31 | 7.63     | 8.14 | 1.43  |
| 4085  |       |      | 30.55 | 5.79           | 1.34  |      |      | 7.88     |      |       |

| Depth                                      | CONC = pmol/kg |      |       |      |       |      |      |      |      |      |
|--|----------------|------|-------|------|-------|------|------|------|------|------|
|  | La             | Ce   | Nd    | Sm   | Eu    | Gd   | Dy   | Er   | Yb   | Lu   |
| -  | -              | -    | -     | -    | -     | -    | -    | -    | -    | -    |
| 4105                                       |                |      | 29.04 |      |       |      |      |      | 3.57 |      |
| 4250                                       | 39.35          | 5.14 | 27.39 | 5    | 1.31  | 6.98 | 7.89 | 7.17 | 7.61 | 1.33 |
| 4499                                       | 43.35          | 5.21 | 28.3  | 5.17 |       | 7.03 | 8.03 | 7.33 |      | 1.32 |
| 4730                                       |                |      |       | 5.99 | 1.05  |      |      |      |      | 1.00 |
| <b>CD-1503 (18 36.7'S &amp; 55 36.2'E)</b> |                |      |       |      |       |      |      |      |      |      |
| 6  | 9              | 4.87 | 8.43  | 1.87 |       | 1.95 |      | 2.57 | 2.35 | 0.31 |
| 50   |                | 5.31 | 7.48  | 1.58 | 0.48  | 2.64 | 3.54 | 2.59 | 1.86 | 0.28 |
| 90   | 9.27           | 5.58 | 8.32  | 1.63 | 0.492 | 2.69 | 3.34 | 2.34 | 2.24 | 0.35 |
| 115  | 9.39           | 5.24 | 7.75  | 1.64 | 0.51  | 2.7  | 3.48 | 3.08 | 2.58 | 0.42 |
| 225  |                | 4.57 | 7.41  | 1.47 | 0.466 | 2.47 | 3.06 | 2.89 | 2.34 | 0.36 |
| 250  | 8.68           | 5.17 | 7.23  | 1.5  | 0.44  | 2.87 | 3.15 | 2.83 | 2.3  | 0.34 |
| 323  | 10.94          | 4.29 | 8.13  |      |       | 2.5  | 3.34 | 3.38 | 2.85 | 0.47 |
| 393  |                | 4.28 | 7.96  | 1.6  | 0.463 | 2.61 | 3.33 | 3.17 | 2.86 | 0.48 |
| 520  | 11.18          | 3.46 | 8.08  | 1.53 | 0.433 | 2.6  | 3.37 | 3.28 | 3.03 | 0.51 |
| 650  | 12.22          | 2.64 | 8.48  | 1.62 |       | 2.75 | 3.58 | 3.33 | 3.41 | 0.59 |
| 799  | 18.08          |      | 11.49 | 2.13 | 0.59  | 3.51 | 4.3  | 4.28 | 4.4  | 0.77 |
| 825  | 17.71          | 2.69 | 10.72 | 2.07 | 0.585 | 3.42 | 4.31 | 4.39 | 4.5  | 0.83 |
| 1000                                       |                | 3.25 | 12.53 | 2.31 |       | 4.53 | 5.29 |      | 5.67 | 0.94 |
| 1392                                       | 25.7           | 3.47 | 15.17 | 2.82 | 0.803 | 4.62 | 5.67 | 5.63 | 6.02 | 1.08 |
| 1700                                       |                | 5.7  | 17.91 | 3.26 | 0.911 | 5.11 | 6.25 | 6.15 | 6.59 | 1.18 |
| 2200                                       |                | 5.11 | 21.67 | 3.99 | 1.09  | 6.1  | 7.3  | 6.97 | 7.44 | 1.32 |
| 2620                                       | 38.53          | 4.29 | 23.32 | 4.25 | 1.17  | 6.39 | 7.55 | 7.12 | 7.64 | 1.36 |
| 2700                                       | 39.94          | 4.28 | 23.93 | 4.32 | 1.19  | 6.6  | 7.76 | 7.25 | 7.82 | 1.35 |
| 4002                                       | 0              | 4.89 | 28.26 | 5.13 | 1.38  | 6.64 | 8.32 | 7.56 | 8.05 | 1.44 |
| 4380                                       | 45.99          | 8.9  | 29.2  | 5.36 | 1.4   | 7.52 | 8.46 | 7.54 | 8    | 1.33 |
| 4499                                       |                |      | 28.86 | 5.28 | 1.37  | 7.38 | 8.33 | 7.39 | 7.91 | 1.38 |
| 4577                                       | 43.1           | 6.91 | 29.48 | 5.4  | 1.39  | 7.1  | 8.73 | 7.87 | 8.04 | 1.44 |
| 4630                                       | 38.33          | 6.54 | 29.34 | 5.25 | 1.36  | 7.38 | 8.16 | 7.35 | 7.7  | 1.36 |
| <b>CD-1504 (27 00.5'S &amp; 56 58.0'E)</b> |                |      |       |      |       |      |      |      |      |      |
| 11   | 10.48          | 8.71 | 8.23  | 1.67 | 0.483 | 2.57 | 3.2  | 2.82 | 2.15 | 0.33 |
| 25   | 9.52           | 7.83 | 7.91  | 1.62 | 0.471 | 2.51 | 3.17 | 2.79 | 2.11 | 0.33 |
| 60   | 9.91           | 7.47 |       |      |       |      |      |      |      |      |
| 77   |                |      |       |      |       |      |      |      |      |      |
| 101  | 9.93           | 8.13 | 7.9   | 1.59 | 0.46  | 2.52 | 3.17 | 2.82 | 2.16 | 0.33 |
| 152  | 8.68           | 7.17 | 7.05  | 1.42 | 0.418 | 2.43 | 3.03 | 2.71 | 2.13 | 0.33 |
| 298  | 10.16          | 6.03 | 8.12  | 1.61 | 0.468 | 2.57 | 3.31 | 2.97 | 2.47 | 0.4  |
| 305  |                | 9.98 | 7.96  | 1.62 |       |      | 3.13 | 3.09 |      | 0.4  |
| 401  | 12             | 8.25 | 9.5   | 1.88 | 0.517 | 2.84 | 3.6  | 3.28 | 2.76 | 0.45 |
| 500  |                | 4.85 | 8.36  | 1.66 | 0.464 | 2.95 | 3.44 | 3.22 | 2.8  | 0.45 |
| 606  | 11.09          | 4.09 | 8.23  | 1.6  | 0.455 | 2.57 | 3.41 | 3.28 | 2.9  | 0.48 |
| 699  | 11.38          | 2.99 | 8.4   | 1.61 | 0.435 |      |      | 3.72 | 3.08 |      |
| 799  | 12.33          | 2.85 | 8.61  | 1.67 | 0.478 | 2.69 | 3.51 | 3.47 | 3.27 | 0.55 |
| 900  | 13.37          | 2.25 | 9.1   | 1.74 | 0.485 | 2.85 | 3.69 | 3.72 | 3.56 | 0.64 |
| 1000                                       | 14.87          | 2.05 | 9.82  | 1.84 | 0.515 | 3.5  | 3.85 | 3.98 | 3.92 | 0.7  |
| 1250                                       | 17.27          | 2.92 | 10.37 | 1.93 | 0.543 | 3.26 | 4.15 | 4.25 | 4.42 | 0.81 |
| 1500                                       |                | 3.28 | 12.84 | 2.39 | 0.668 | 4.71 | 4.99 | 5.15 | 5.48 | 0.98 |
| 1750                                       | 26.31          | 3.88 | 15.34 | 2.78 | 0.757 |      | 6.03 | 5.69 | 5.95 | 1.11 |
| 1795                                       | 25.41          |      | 14.75 | 2.63 | 0.733 |      | 5.5  | 5.58 | 5.96 | 1.1  |
| 2000                                       | 30             | 4.36 | 16.48 | 3.01 | 0.834 | 4.89 | 5.98 | 6.05 | 6.16 | 1.14 |

| Depth  | CONC = pmol/kg |       |       |      |       |      |       |      |      |      |
|--|----------------|-------|-------|------|-------|------|-------|------|------|------|
|  | La             | Ce    | Nd    | Sm   | Eu    | Gd   | Dy    | Er   | Yb   | Lu   |
| -  | -              | -     | -     | -    | -     | -    | -     | -    | -    | -    |
| 2005   | 29.12          | 4.5   | 17.64 | 3.15 | 0.877 | 5    | 6.14  | 6.01 | 6.41 | 1.15 |
| 2250   | 30.83          | 5.65  | 19.32 | 3.45 | 0.94  | 5.38 | 6.4   | 6.27 | 6.62 | 1.19 |
| 2451   | 33.56          | 4.33  | 20.52 | 3.71 | 0.977 | 6.32 | 6.9   | 6.51 | 7.01 | 1.25 |
| 2515   |                | 6.53  | 18.99 | 3.43 | 0.891 | 5.26 | 6.52  | 6.12 | 6.21 | 1.46 |
| 2625   | 39.3           | 6.67  | 22.13 | 4.05 | 1.1   | 5.9  | 7.26  | 6.82 | 7.36 | 1.31 |
| 3002   |                |       | 23.17 | 4.28 | 1.14  | 6.6  | 7.67  | 7.1  | 7.53 | 1.41 |
| 3100   |                |       | 24.91 | 4.62 | 0.978 | 6.44 | 0     | 7.16 | 6.55 | 1.43 |
| 3249   | 38.95          | 4.21  | 24.34 | 4.42 | 1.2   | 6.7  | 7.89  | 7.17 | 7.7  | 1.44 |
| 3499   | 40.81          | 4.34  | 25.28 | 4.59 | 1.24  | 6.79 | 7.97  | 7.23 | 7.69 | 1.37 |
| 3691   |                | 7.31  | 27.22 | 4.83 |       | 7    | 7.89  | 8.5  | 7.6  |      |
| 4250   | 41.08          | 7.15  | 26.59 | 4.89 | 1.29  | 7.02 | 7.87  | 7.16 | 7.65 | 1.35 |
| 4505   | 42             | 5.49  | 27.34 | 5.02 | 1.25  |      | 9.83  | 7.07 | 7.18 | 1.44 |
| 4849   | 42.05          | 4.69  | 27.58 | 5.1  | 1.32  | 6.61 | 8.07  | 7.21 | 7.64 | 1.36 |
| 4876   | 42.68          | 6.13  | 28.13 | 5.16 | 1.33  | 7.2  | 8.04  | 7.2  | 7.68 | 1.34 |
| 5220   |                | 6.46  | 26.46 | 4.83 | 1.22  | 7.19 | 8.4   | 8.38 | 7.27 | 1.89 |
| <b>CD-1505 (24 36.5'S &amp; 57 03.9'E) 4950m</b> |                |       |       |      |       |      |       |      |      |      |
| 10   | 9.18           | 6.13  | 7.67  | 1.59 | 0.457 | 2.5  | 3.13  | 2.65 | 1.99 | 0.31 |
| 60   | 10.99          | 10.47 | 9.07  | 1.82 | 0.509 | 2.7  | 3.21  | 2.77 | 2.1  | 0.32 |
| 90   | 9.53           | 7.78  | 7.75  | 1.58 | 0.466 | 2.5  | 3.12  | 2.81 | 2.09 | 0.32 |
| 125  | 10.8           | 11.65 | 9.3   | 1.85 | 0.513 | 2.67 | 3.25  | 2.79 | 2.13 | 0.32 |
| 245  | 9.22           | 6.77  | 7.65  | 1.52 | 0.424 | 2.32 | 2.94  | 2.64 | 2.06 | 0.33 |
| 450  | 9.71           | 5.39  | 7.51  | 1.47 | 0.408 | 2.29 | 2.95  | 2.77 | 2.36 | 0.38 |
| 652  | 10.65          | 3.21  | 7.75  | 1.51 | 0.425 | 2.47 | 3.26  | 3.22 | 2.92 | 0.48 |
| 875  | 13.56          |       | 9.44  | 1.81 | 0.497 | 2.89 | 3.79  | 3.78 | 3.65 | 0.63 |
| 1150   | 16.87          | 2.43  | 10.28 | 1.95 | 0.545 | 3.23 | 4.07  | 4.25 | 4.31 | 0.8  |
| <b>CD-1506 (08 27.4'S &amp; 52 43.9'E) 5135m</b> |                |       |       |      |       |      |       |      |      |      |
| 93   | 12.7           | 3.23  | 9.74  | 2    | 0.588 | 3.24 | 4.08  | 3.73 | 3.6  | 0.7  |
| 100  | 14.4           | 2.63  | 10.41 | 2.14 | 0.656 | 3.34 |       | 3.88 | 3.84 | 0.67 |
| 395  |                | 2.06  | 10.1  | 2.06 |       | 3.23 | 4.12  | 3.95 | 3.91 | 0.69 |
| 695  |                | 3.08  | 11.93 | 2.35 | 0.681 | 3.84 | 5     | 4.44 | 4.52 | 0.89 |
| 957  | 20.9           | 4.57  | 13.43 | 2.6  | 0.745 | 4.06 | 4.88  | 4.68 | 4.87 | 0.86 |
| 1500   | 28.3           | 4.46  | 17.22 | 3.25 | 0.905 | 5.1  | 6.23  | 6.01 | 6.58 | 1.1  |
| 2300   | 32.4           | 4.56  | 19.94 | 3.66 | 1.01  | 5.86 | 6.71  | 6.38 | 6.88 | 1.23 |
| 3000   |                | 4.75  | 24.97 | 4.54 | 1.19  | 8.15 | 7.85  | 7.48 | 8.03 | 1.5  |
| 3398   |                |       |       |      |       |      |       |      | 9.92 |      |
| 3500   | 46.85          |       | 29.67 | 5.4  | 1.41  | 7.5  | 8.35  | 7.73 | 8.31 | 1.48 |
| 4000   |                | 6.19  | 27.76 |      | 1.27  | 7.75 | 8.885 | 7.7  | 8.02 | 1.71 |
| 4251   | 47.47          | 5.06  | 28.32 | 5.22 | 1.38  | 7.42 | 8.46  | 7.61 | 8.1  | 1.45 |
| 5128   | 41.23          | 5.5   | 27.18 | 4.98 | 1.3   | 6.87 | 7.74  | 6.95 | 7.38 | 1.29 |
| <b>CD-1507 (06 09.2'S &amp; 50 53.7'E)</b>       |                |       |       |      |       |      |       |      |      |      |
| 10   | 8.21           | 4.96  | 6.9   | 1.4  | 0.412 | 2.28 | 3     | 2.49 | 1.81 | 0.34 |
| 25   | 8.85           | 5.71  | 7.32  | 1.47 | 0.41  | 2.24 | 3.64  | 3.68 | 2.05 | 0.28 |
| 50   | 8.78           |       | 7.25  | 1.43 | 0.424 | 2.01 | 2.96  | 2.61 | 2    | 0.32 |
| 75   | 9.29           | 5.35  | 7.44  | 1.51 | 0.442 | 2.63 | 3.02  | 2.74 | 2.12 |      |
| 80   | 10.79          | 4.69  | 7.68  | 1.57 | 0.47  | 2.66 | 3.38  | 3.22 | 2.85 | 0.49 |
| 85   |                |       | 7.91  | 1.61 | 0.5   | 2.7  | 3.4   | 3.15 | 2.8  | 0.54 |
| 125  | 12             | 3.64  | 8.6   | 1.74 | 0.5   |      | 3.58  | 3.5  | 3.28 | 0.56 |
| 151  | 12.1           | 3.68  | 9.26  | 2.17 | 0.531 |      | 3.6   | 3.61 | 3.39 |      |
| 210  | 13.63          | 3.87  | 9.77  | 1.96 | 0.557 | 2.98 | 3.65  | 3.64 | 3.5  | 0.61 |

| Depth                                      | CONC = pmol/kg |      |       |      |       |      |      |      |      |       |
|--|----------------|------|-------|------|-------|------|------|------|------|-------|
|  | La             | Ce   | Nd    | Sm   | Eu    | Gd   | Dy   | Er   | Yb   | Lu    |
| -  | -              | -    | -     | -    | -     | -    | -    | -    | -    | -     |
| 278  |                |      | 9.85  | 1.96 | 0.559 | 3.22 | 3.92 | 3.8  | 3.67 | 0.64  |
| 345  |                | 4.11 | 10.13 | 2    | 0.456 |      |      | 3.83 | 4.5  | 0.65  |
| 370  | 14.45          | 2.89 | 10.05 | 1.99 |       | 3.17 | 3.69 | 3.88 | 3.78 | 0.67  |
| 370  | 14.61          | 3.22 | 9.74  | 1.89 | 0.54  |      | 3.87 | 3.8  | 3.76 | 0.7   |
| 448  | 15.48          | 2.67 | 10.6  | 2.09 | 0.602 |      | 4.29 | 4.04 | 4.05 |       |
| 550  | 19.47          | 4.15 | 12.56 | 2.45 | 0.702 | 3.85 | 4.72 | 4.58 | 4.65 | 0.81  |
| 601  |                | 3.12 | 11.54 | 2.24 | 0.64  |      | 4.42 | 4.31 | 4.37 | 0.77  |
| 650  |                | 2.81 | 11.39 | 2.22 | 0.61  |      |      | 4.52 |      |       |
| 785  | 18.06          | 3.91 | 12.95 | 2.5  | 0.71  | 4.4  | 4.77 | 4.63 | 4.71 | 0.83  |
| 880  | 22.84          | 4.33 | 14.84 | 3    | 0.81  | 4.41 | 5.24 | 5.02 | 5.09 | 0.92  |
| 965  | 23.85          | 3.8  |       | 2.93 | 0.839 |      |      |      | 5.38 |       |
| 1137                                       | 25.01          | 5.3  | 15.82 | 3.06 | 0.87  | 5.23 | 5.74 | 5.48 | 5.65 | 1.03  |
| 1301                                       | 25.6           | 4.91 | 16.32 | 3.09 | 0.88  | 4.86 | 5.83 | 5.65 | 5.95 | 1.07  |
| 1506                                       | 25.62          | 5.25 | 18    | 3.46 |       |      |      | 6.13 |      |       |
| 1805                                       |                | 4.79 | 18.03 | 3.37 | 0.94  |      | 6.41 | 6.29 | 6.56 | 1.22  |
| 2003                                       | 32.06          | 4.62 | 19.5  | 3.62 | 1.01  | 6.23 | 6.86 | 6.57 | 6.95 | 1.28  |
| 2305                                       | 35.4           | 4.68 | 21.1  |      | 1.08  | 6.93 | 7.38 | 6.88 | 7.41 | 1.38  |
| 2850                                       |                | 4.22 | 25.43 | 4.63 | 1.27  | 6.55 | 8.04 | 7.52 | 8.13 |       |
| 3175                                       | 43             | 4.74 | 25.65 | 4.63 | 1.25  | 6.96 | 8.24 | 7.5  | 7.95 | 1.6   |
| 3451                                       | 44.86          | 6.34 | 28.07 | 5.1  | 1.38  | 7.36 | 8.58 | 7.87 | 8.38 | 1.5   |
| 4000                                       | 46.5           | 5.19 | 28.47 | 5.13 | 1.37  |      | 8.54 | 7.79 | 8.26 | 1.81  |
| 4050                                       | 44             |      | 28.41 | 5.13 | 1.36  | 7.32 | 8.31 | 7.51 | 7.99 | 1.4   |
| 4351                                       | 45.1           | 6.78 | 29.29 | 5.34 | 1.4   | 7.55 | 8.48 | 7.57 | 8.04 | 1.42  |
| 4813                                       |                | 7.06 | 29.47 | 5.39 |       | 7.5  | 8.93 | 7.47 | 8.1  | 1.4   |
| 4845                                       | 45.22          | 5.57 | 29.56 | 5.32 | 1.34  | 7.71 | 8.78 | 7.48 | 6.89 | 2.0   |
| <b>CD-1605 (14 25.6'N &amp; 66 55.4'E)</b> |                |      |       |      |       |      |      |      |      |       |
| 4  | 11.7           | 13.9 | 11.4  | 2.38 |       |      | 3.94 | 3.09 | 2.49 | 0.655 |
| 20   | 12.2           | 12.2 | 11.2  | 2.35 | 0.653 |      |      | 3.01 | 2.35 |       |
| 40   | 11.2           | 11.1 | 11    | 2.34 | 0.642 | 3.41 |      | 2.97 | 2.49 | 0.416 |
| 60   |                | 12.1 | 10.9  | 2.26 | 0.631 |      | 3.65 | 3.01 |      | 0.443 |
| 79   | 12.8           | 12.2 | 11.5  | 2.41 | 0.673 | 3.43 | 3.79 | 3.09 | 2.48 | 0.386 |
| 100  | 12.3           | 9.8  | 11.3  | 2.4  | 0.644 |      | 3.41 |      | 2.64 | 0.451 |
| 100  | 10.4           | 9.8  | 11.1  | 2.32 | 0.598 |      |      | 3.39 | 3.05 |       |
| 120  | 15.5           | 6.2  | 12.2  | 2.56 | 0.73  | 3.66 | 4.26 | 3.67 | 3.26 | 0.521 |
| 130  |                | 7.6  | 12.6  | 2.64 | 0.748 | 3.78 | 4.39 | 3.7  | 3.41 | 0.559 |
| 140  | 18             | 6.7  | 12.6  | 2.68 | 0.764 | 4.04 | 4.25 | 3.74 | 3.39 | 0.553 |
| 150  | 20.2           | 16.3 | 13    | 2.69 | 0.755 | 4.96 | 4.48 | 3.79 | 3.47 | 0.646 |
| 176  | 18.8           |      | 12.8  | 2.58 | 0.728 |      |      | 3.72 | 3.44 |       |
| 201  | 19             | 15.6 | 12.6  | 2.5  | 0.699 | 4.53 | 4.28 | 3.68 |      | 0.646 |
| 300  |                | 12.7 | 12.3  | 2.47 | 0.67  |      | 4.09 |      |      | 0.649 |
| 399  | 15.6           | 10.2 |       | 2.41 | 0.578 |      |      |      |      |       |
| 506  | 15.5           | 5.2  | 11.4  | 2.21 |       |      |      |      |      | 0.661 |
| 700  | 18.4           |      | 12.2  | 2.41 | 0.612 | 3.72 |      | 4.02 | 4.05 |       |
| 1000                                       |                | 5.3  | 14.4  | 3.77 | 0.742 | 4.22 | 4.54 |      | 4.84 | 0.863 |
| 1490                                       | 24.4           | 4.1  | 16    | 3.09 | 0.862 | 4.85 | 5.61 | 5.42 |      | 1.142 |
| 1999                                       |                | 4.9  | 17.5  | 3.37 | 0.942 | 5.03 | 6.6  | 6.14 | 6.78 | 1.302 |
| 2500                                       | 31.2           | 5.4  | 19.2  | 3.58 | 1.006 | 5.62 | 6.89 | 6.66 | 7.35 | 1.33  |
| 2999                                       |                | 5.7  | 22.6  | 4.16 | 1.136 | 6.3  | 7.28 | 7.2  | 7.79 | 1.404 |
| 4001                                       |                | 6.7  | 24.6  | 4.44 | 1.247 | 6.71 |      | 7.52 | 8.08 | 1.462 |

|                                 |      |      |      | CONC = pmol/kg |       |      |      |      |      |       |
|---------------------------------|------|------|------|----------------|-------|------|------|------|------|-------|
| Depth                           | La   | Ce   | Nd   | Sm             | Eu    | Gd   | Dy   | Er   | Yb   | Lu    |
| -                               | -    | -    | -    | -              | -     | -    | -    | -    | -    | -     |
| CD-1608 (22 29.5'N & 60 40.6'E) |      |      |      |                |       |      |      |      |      |       |
| 3                               | 12   | 10.7 | 10.5 | 2.18           | 0.594 |      | 3.9  | 3.31 |      |       |
| 15                              | 11.1 | 9.3  | 10.5 | 2.21           |       | 2.98 |      |      |      | 0.388 |
| 30                              | 10.4 | 6.9  |      | 1.88           |       | 2.9  | 3.76 | 3.2  |      |       |
| 50                              |      | 5.7  | 8.2  | 1.74           | 0.488 | 2.55 | 3.13 | 2.88 | 2.7  | 0.466 |
| 75                              | 13.8 | 6.1  | 9    | 1.84           | 0.52  | 3.02 | 3.24 | 2.98 | 2.8  | 0.477 |
| 100                             | 13.8 | 6.7  | 9.8  | 1.96           | 0.541 | 3.23 | 3.59 | 3.12 | 2.96 |       |
| 125                             | 16   | 7.4  | 10.8 | 2.12           | 0.593 | 3.28 | 3.56 | 3.26 | 3.11 | 0.527 |
| 176                             | 15.3 | 6.5  | 10.5 | 2.12           | 0.597 | 3.19 | 3.66 | 3.36 | 3.26 | 0.549 |
| 200                             | 15.7 | 6.5  | 10.6 | 2.15           | 0.605 | 3.19 | 3.66 | 3.55 | 3.27 | 0.553 |
| 203                             | 14.5 | 7.3  | 10.7 | 2.14           | 0.605 | 3.28 | 3.46 | 3.58 | 3.4  | 0.569 |
| 240                             | 15.6 | 7    | 10.8 | 2.19           | 0.618 | 3.44 | 3.59 | 3.27 | 3.21 | 0.557 |
| 400                             | 15.4 | 7.2  | 10.4 | 2.09           | 0.598 | 3.15 | 3.75 | 3.46 | 3.45 | 0.594 |
| 600                             | 14.8 | 6.8  | 9.9  | 2.03           | 0.58  | 3.49 | 3.6  | 3.5  | 3.59 | 0.676 |
| 799                             | 15.7 | 6.8  | 10.9 | 2.19           | 0.623 | 3.49 | 4.02 | 3.87 | 4.06 | 0.827 |
| 1000                            | 20   | 4.1  | 12.3 | 2.42           | 0.659 | 3.74 | 4.39 | 4.35 | 4.44 | 0.795 |
| 1200                            |      | 3.6  | 13.5 | 2.95           | 0.743 | 3.99 | 4.67 | 4.52 | 4.74 | 0.862 |
| 1599                            | 23.1 | 3.1  | 14.2 | 2.8            | 0.791 | 4.31 | 5.03 | 5.13 |      |       |
| 2000                            | 23.4 | 2.2  | 14.4 | 2.84           |       |      | 6.18 | 6.44 | 7.64 |       |
| CD-1609 (23 35.4'N & 58 59.9'E) |      |      |      |                |       |      |      |      |      |       |
| 4                               | 13   | 11.8 | 12.9 | 2.89           | 0.793 | 3.66 | 4    | 2.5  | 1.77 | 0.623 |
| 15                              | 12.7 | 9.7  | 11.3 | 2.37           | 0.645 | 3.19 | 2.99 | 2.16 | 1.49 | 0.224 |
| 20                              | 11.4 | 9.2  | 11.3 | 2.3            | 0.61  |      | 3.09 | 2.02 | 1.47 |       |
| 24                              |      | 7.7  | 10.9 | 2.3            | 0.629 | 3.37 | 3.49 | 2.5  | 1.95 | 0.328 |
| 30                              | 13.6 | 7.4  | 11.1 | 2.44           | 0.694 | 3.52 | 3.91 | 3.18 | 2.82 | 0.464 |
| 35                              | 13   | 7.1  | 10.7 | 2.4            | 0.677 | 3.62 | 3.76 | 3.09 | 2.73 | 0.462 |
| 40                              |      | 6.3  | 10.7 | 2.43           | 0.69  | 4.13 | 3.95 | 3.28 | 3.01 | 0.498 |
| 60                              |      | 4.4  | 11   | 2.44           | 0.686 | 4.13 | 4.01 | 3.37 | 3.03 | 0.509 |
| 90                              | 13.9 | 4.4  | 10.5 | 2.31           | 0.65  | 3.53 | 3.88 | 3.28 | 3.01 | 0.514 |
| 120                             |      | 6.3  | 10.7 | 2.29           | 0.648 | 3.68 | 3.9  | 3.32 | 3.11 | 0.546 |
| 141                             | 13.6 | 5.4  | 9.7  | 2.08           | 0.582 | 2.97 | 4.35 | 3.67 | 3    | 0.51  |
| 170                             | 13.6 | 6.6  | 9.7  | 2.08           | 0.593 | 3.23 | 3.48 | 3.1  | 2.95 | 0.538 |
| 200                             |      | 7.1  | 10.4 | 2.11           | 0.593 | 3.41 |      |      | 3.04 | 0.535 |
| 300                             |      | 4    | 8.9  | 1.9            | 0.499 | 2.9  | 3.46 | 3.13 | 2.89 | 0.481 |
| 400                             | 14.6 | 4.7  | 10   | 2.05           | 0.579 | 3.65 | 3.5  | 3.3  | 3.25 | 0.567 |
| 600                             | 14.9 | 7.2  | 9.8  | 2.03           | 0.585 | 3.12 |      |      | 3.63 |       |
| 800                             | 17.1 | 6    | 11.1 | 2.24           | 0.631 | 3.43 | 4.03 | 3.83 | 3.93 | 0.699 |
| 1000                            | 19.7 | 3.8  | 12.4 | 2.45           | 0.691 | 4.03 | 4.42 | 4.18 | 4.32 | 0.761 |
| 2000                            |      | 2.4  | 14.8 | 2.89           | 0.818 | 4.53 | 5.25 |      | 6.36 | 1.13  |
| 2750                            |      | 3.2  | 16   | 2.97           |       | 4.72 | 5.85 | 6.58 | 6.96 | 1.16  |
|                                 |      |      |      |                |       |      |      |      |      |       |
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|                                 |      |      |      |                |       |      |      |      |      |       |
|                                 |      |      |      |                |       |      |      |      |      |       |

| Depth                                  | CONC = pmol/kg |       |                             |       |       |       |       |       |       |       |
|--|----------------|-------|-----------------------------|-------|-------|-------|-------|-------|-------|-------|
|  | La             | Ce    | Nd                          | Sm    | Eu    | Gd    | Dy    | Er    | Yb    | Lu    |
| -                                      | -              | -     | -                           | -     | -     | -     | -     | -     | -     | -     |
|  |                |       |                             |       |       |       |       |       |       |       |
|  |                |       |                             |       |       |       |       |       |       |       |
| <b>Bertram &amp; Elderfield (1993)</b> |                |       | <b>2. Particle REE Data</b> |       |       |       |       |       |       |       |
|  |                |       | [pmol/kg of water]          |       |       |       |       |       |       |       |
| <b>Madagascar Basin (Sta 1504)</b>     |                |       |                             |       |       |       |       |       |       |       |
| 300                                    |                | 0.436 | 0.135                       | 0.024 | 0.006 | 0.032 | 0.032 | 0.015 | 0.014 | 0.002 |
| 500                                    |                | 0.613 | 0.166                       | 0.033 | 0.008 | 0.038 | 0.029 | 0.018 | 0.012 | 0.002 |
| 1180                                   | 0.199          | 0.727 | 0.146                       |       | 0.008 | 0.036 |       | 0.019 | 0.015 | 0.003 |
| 2000                                   |                | 0.850 | 0.299                       |       | 0.010 | 0.048 | 0.038 | 0.023 | 0.019 | 0.003 |
| 2515                                   | 0.315          | 1.140 | 0.362                       | 0.059 | 0.012 | 0.053 | 0.045 | 0.026 | 0.021 | 0.003 |
| 3100                                   | 0.280          | 1.310 | 0.496                       |       | 0.012 | 0.054 |       |       | 0.021 | 0.003 |
| 3691                                   |                |       |                             |       |       |       |       |       |       | 0.002 |
| 4505                                   | 0.435          | 1.400 | 0.497                       | 0.102 | 0.017 |       |       | 0.043 |       |       |
| 5220                                   | 0.515          | 1.430 | 0.551                       | 0.107 | 0.025 | 0.097 | 0.081 | 0.043 | 0.035 |       |
| <b>Somali Basin (Sta 1597)</b>         |                |       |                             |       |       |       |       |       |       |       |
| 75                                     | 0.285          | 0.123 | 0.154                       | 0.025 | 0.001 | 0.031 | 0.037 | 0.026 | 0.025 | 0.005 |
| 125                                    | 0.309          | 0.504 | 0.220                       | 0.046 | 0.010 | 0.056 | 0.066 | 0.041 | 0.037 | 0.006 |
| 365                                    | 0.438          | 0.969 | 0.352                       | 0.070 | 0.010 | 0.056 | 0.066 | 0.041 | 0.037 | 0.006 |
| 785                                    |                | 1.005 | 0.473                       | 0.081 | 0.010 | 0.080 | 0.075 | 0.042 | 0.037 | 0.006 |
| 1300                                   | 0.527          | 1.031 | 0.440                       | 0.082 | 0.019 | 0.079 | 0.069 | 0.041 | 0.037 | 0.006 |
| 1805                                   | 0.384          | 1.058 | 0.399                       | 0.068 | 0.017 |       | 0.070 | 0.036 | 0.033 | 0.006 |
| 2300                                   |                | 0.981 | 0.331                       | 0.068 | 0.011 | 0.064 | 0.057 | 0.032 | 0.030 | 0.005 |
| 3175                                   | 0.383          | 0.881 | 0.336                       | 0.066 | 0.016 |       |       | 0.029 | 0.027 |       |
| 3999                                   | 0.531          | 1.211 | 0.692                       | 0.091 | 0.021 | 0.117 | 0.084 | 0.043 | 0.032 | 0.005 |

**Table A9: Handbook section 6.1. Pacific Ocean seawater**

File names: HE1.XLS, HE2.XLS and HE3.XLS.

H. Elderfield's unpublished data on the concentration of RE  
in Pacific Ocean seawater

| Pacific Ocean Seawater Data of Dr. H. Elderfield [in prep.] |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|---|-------|---|--------|---|-------|------|------|-------|------|------|------|------|------|------|------|
| HE1.XLS   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
| Map #21   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
| ID  | LAT   |   | LON    |   | Depth | La   | Ce   | Nd    | Sm   | Eu   | Gd   | Dy   | Er   | Yb   | Lu   |
| VERTEX Project  |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
| Sta.  | 33.00 | N | 139.00 | W | 8     | 5.78 | 7.95 | 4.16  | 0.76 | 0.21 |      | 1.51 | 1.43 | 0.88 | 0.12 |
| TA  |       |   |        |   | 20    |      | 5.67 | 3.89  | 0.73 | 0.20 | 1.40 | 1.54 | 1.41 | 0.89 | 0.13 |
|   |       |   |        |   | 60    | 4.94 | 3.47 | 3.75  | 0.70 | 0.19 | 1.20 | 1.52 | 1.40 | 0.87 | 0.14 |
|   |       |   |        |   | 80    | 4.72 | 3.56 | 3.55  | 0.67 | 0.18 | 1.24 | 1.53 | 1.41 | 0.89 | 0.13 |
|   |       |   |        |   | 100   | 4.39 | 2.89 | 3.53  | 0.67 | 0.19 | 1.15 | 1.59 | 1.50 | 0.97 | 0.15 |
|   |       |   |        |   | 150   | 6.87 | 3.53 | 4.93  | 0.97 | 0.28 | 1.81 | 2.24 | 2.07 | 1.61 | 0.27 |
|   |       |   |        |   | 290   | 12.1 | 4.85 | 8.04  | 1.60 | 0.44 | 2.80 | 3.46 | 3.24 | 2.77 | 0.45 |
|   |       |   |        |   | 490   | 23.6 | 4.24 | 14.16 | 2.62 |      | 4.20 | 5.24 | 4.82 | 4.47 | 0.83 |
| T5  | 39.60 | N | 140.77 | W | 8     | 7.53 |      | 5.08  | 0.87 | 0.20 | 1.37 | 1.55 | 1.41 | 0.82 | 0.13 |
|   |       |   |        |   | 40    | 6.21 | 4.33 | 3.90  | 0.65 | 0.18 | 1.17 | 1.45 | 1.34 | 0.74 | 0.14 |
|   |       |   |        |   | 80    | 9.11 |      | 5.98  | 1.06 | 0.22 | 1.62 | 1.82 | 1.65 | 1.08 | 0.14 |
|   |       |   |        |   | 100   | 10.4 | 3.27 | 6.82  | 1.25 | 0.35 | 1.78 | 2.67 | 2.44 | 1.84 | 0.31 |
|   |       |   |        |   | 150   | 14.3 |      | 9.40  | 1.85 | 0.46 | 2.50 | 3.44 | 3.21 | 2.63 | 0.44 |
|   |       |   |        |   | 200   | 14.8 | 2.24 | 9.56  | 1.85 | 0.51 | 2.67 | 3.97 | 3.61 | 3.19 | 0.53 |
|   |       |   |        |   | 290   | 17.0 | 4.18 | 10.9  | 2.10 | 0.59 | 3.45 | 4.37 | 3.99 | 3.44 | 0.63 |
|   |       |   |        |   | 390   | 22.5 | 2.28 | 13.4  | 2.50 | 0.27 | 4.13 | 5.06 | 4.76 | 4.42 | 0.77 |
|   |       |   |        |   | 490   | 27.5 | 4.90 | 15.8  | 2.90 |      | 4.72 | 5.63 | 5.19 | 4.98 | 0.87 |
|   |       |   |        |   | 580   | 32.1 | 3.07 | 18.3  | 3.28 | 0.58 | 5.24 | 6.18 | 5.73 | 5.53 | 0.98 |
|   |       |   |        |   | 685   | 33.1 | 6.27 | 19.2  | 3.47 | 0.72 | 8.36 | 6.46 | 6.07 | 5.93 | 1.04 |
|   |       |   |        |   | 700   |      | 3.42 | 20.3  | 3.64 | 1.00 | 9.34 |      | 6.55 | 6.52 | 1.22 |
|   |       |   |        |   | 890   | 37.6 | 3.94 | 21.2  | 3.81 | 1.03 | 6.16 | 7.21 | 6.81 | 6.89 | 1.24 |
|   |       |   |        |   | 990   | 37.7 | 5.27 | 21.0  | 3.80 | 0.97 | 6.32 | 7.03 | 7.54 | 7.72 | 1.30 |
|   |       |   |        |   | 1230  | 41.6 | 5.35 | 22.8  | 4.14 | 1.13 |      | 8.37 | 7.94 | 7.98 | 1.52 |
|   |       |   |        |   | 1480  | 42.4 | 5.03 | 23.7  | 4.30 | 1.00 | 7.38 | 8.63 | 8.88 | 9.24 | 1.71 |
| T6  | 45.00 | N | 142.87 | W | 8     | 12.1 | 3.32 | 7.46  | 1.34 | 0.36 | 2.10 | 2.67 | 2.41 | 1.70 | 0.33 |
|   |       |   |        |   | 40    | 13.6 | 4.85 | 8.3   | 1.47 | 0.42 | 2.53 | 2.83 | 2.64 | 1.95 | 0.32 |
|   |       |   |        |   | 100   | 16.8 | 2.94 | 11.1  | 2.14 | 0.58 | 3.36 | 4.33 | 3.82 | 3.19 |      |
|   |       |   |        |   | 150   | 18.5 | 2.21 | 12.2  | 2.35 | 0.64 | 3.79 | 4.62 | 4.15 | 3.75 | 0.64 |
|   |       |   |        |   | 200   | 21.3 | 5.00 | 13.4  | 2.54 | 0.65 | 4.12 | 4.95 | 4.52 | 4.16 | 0.70 |
|   |       |   |        |   | 290   | 23.6 | 2.27 | 14.3  | 2.69 | 0.74 | 5.21 | 5.60 | 4.59 | 4.55 | 0.77 |
|   |       |   |        |   | 390   | 28.3 | 3.09 | 16.7  | 3.09 | 1.14 | 4.96 | 5.80 | 5.27 | 5.08 | 0.90 |
|   |       |   |        |   | 400   | 32.0 | 2.70 | 18.5  | 3.40 | 0.93 | 5.40 | 6.31 | 5.71 | 5.55 | 0.98 |
|   |       |   |        |   | 500   | 34.3 | 4.33 | 19.7  | 3.62 | 0.98 | 6.59 | 6.62 | 6.13 | 6.01 | 1.05 |
|   |       |   |        |   | 690   | 37.7 | 4.10 | 20.5  | 3.71 | 1.00 | 6.06 | 6.90 | 6.52 | 6.41 | 1.16 |
|   |       |   |        |   | 780   | 37.6 | 4.64 |       | 3.81 | 0.73 | 6.22 | 7.20 | 6.82 | 6.91 | 1.24 |
|   |       |   |        |   | 875   | 37.3 | 3.38 | 20.9  | 3.80 | 1.04 | 6.29 | 7.24 | 6.93 | 6.96 | 1.27 |
|   |       |   |        |   | 975   | 39.9 | 5.65 | 21.9  | 3.96 | 1.09 | 6.51 | 7.64 | 7.43 | 7.68 | 1.35 |
|   |       |   |        |   | 1230  |      | 3.84 | 23.3  | 4.24 |      | 6.96 | 8.43 | 8.16 | 8.65 | 1.58 |
|   |       |   |        |   | 1480  | 43.5 | 5.12 | 24.1  | 4.38 | 1.21 | 7.32 | 8.85 | 8.66 | 9.34 | 1.70 |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |
|   |       |   |        |   |       |      |      |       |      |      |      |      |      |      |      |

| Pacific Ocean Seawater Data of Dr. H. Elderfield [in prep.] |       |   |        |   |       |      |      |      |      |      |      |      |      |      |      |
|---|-------|---|--------|---|-------|------|------|------|------|------|------|------|------|------|------|
| HE1.XLS   |       |   |        |   |       |      |      |      |      |      |      |      |      |      |      |
| Map #21   |       |   |        |   |       |      |      |      |      |      |      |      |      |      |      |
| ID  | LAT   |   | LON    |   | Depth | La   | Ce   | Nd   | Sm   | Eu   | Gd   | Dy   | Er   | Yb   | Lu   |
| VERTEX Project  |       |   |        |   |       |      |      |      |      |      |      |      |      |      |      |
| T7  | 50.00 | N | 145.00 | W | 40    | 12.2 | 3.90 | 7.0  | 1.17 | 0.33 | 2.07 | 2.59 | 2.54 | 1.93 | 0.32 |
|   |       |   |        |   | 80    | 16.8 | 3.52 | 9.9  | 1.74 | 0.51 | 2.99 | 3.49 | 3.23 | 2.66 | 0.45 |
|   |       |   |        |   | 100   | 22.8 | 2.59 | 14.6 | 2.70 | 0.73 | 4.00 | 5.08 | 4.58 | 4.26 | 0.72 |
|   |       |   |        |   | 150   | 27.7 | 2.97 | 16.7 | 3.07 | 0.84 | 4.81 | 5.75 | 5.09 | 4.83 | 0.84 |
|   |       |   |        |   | 200   |      |      | 17.7 | 3.12 | 0.86 | 4.88 | 5.92 | 5.41 | 5.22 | 0.93 |
|   |       |   |        |   | 250   | 32.9 | 2.79 | 18.2 | 3.32 | 0.90 | 5.30 | 6.10 | 5.56 | 5.35 | 0.96 |
|   |       |   |        |   | 300   | 33.2 | 3.72 | 19.2 | 3.48 | 0.94 | 5.62 | 6.54 | 6.00 | 5.85 | 1.16 |
|   |       |   |        |   | 480   | 35.0 | 3.11 | 20.0 | 3.64 | 1.00 | 5.93 | 6.64 | 6.36 | 6.26 | 1.15 |
|   |       |   |        |   | 500   | 37.8 | 8.10 | 22.4 | 4.09 | 1.09 |      |      | 6.69 | 6.44 |      |
|   |       |   |        |   | 700   | 38.4 | 5.04 | 21.6 | 3.95 | 1.06 | 6.49 | 7.45 | 7.20 | 7.32 | 1.32 |
|   |       |   |        |   | 800   | 38.9 | 3.60 | 21.5 | 3.92 | 1.07 | 5.63 | 8.39 | 7.33 | 6.48 |      |
|   |       |   |        |   | 900   | 40.2 | 4.07 | 22.2 | 4.05 | 1.12 | 6.72 | 8.35 | 7.65 | 6.33 | 1.57 |
|   |       |   |        |   | 1000  | 42.3 | 4.12 | 23.5 | 4.28 | 1.18 | 7.06 | 8.67 | 8.20 | 8.74 | 2.72 |
|   |       |   |        |   | 1250  | 43.5 | 4.89 | 24.7 | 4.50 |      | 7.49 | 8.99 | 8.77 | 9.47 | 1.74 |
| T8  | 55.50 | N | 147.50 | W | 8     | 11.4 | 4.34 | 6.8  | 1.14 | 0.35 | 1.97 | 2.50 | 2.33 | 1.71 | 0.29 |
|   |       |   |        |   | 40    | 13.3 | 2.87 | 7.7  | 1.35 | 0.38 | 2.31 | 2.87 | 2.72 | 2.15 | 0.37 |
|   |       |   |        |   | 80    | 25.3 | 3.26 | 14.4 | 2.55 | 0.76 | 4.14 | 4.25 |      | 4.04 | 0.76 |
|   |       |   |        |   | 100   | 28.9 | 4.09 | 16.1 | 2.86 | 0.79 | 4.43 | 5.26 | 4.98 | 4.68 | 0.81 |
|   |       |   |        |   | 150   | 31.6 | 3.52 | 17.7 | 3.12 | 0.86 | 4.88 | 5.92 | 5.41 | 5.22 | 0.93 |
|   |       |   |        |   | 200   | 33.2 |      | 18.8 | 3.31 | 0.91 | 5.41 | 6.37 | 5.59 | 5.54 | 0.99 |
|   |       |   |        |   | 250   | 31.0 | 3.45 | 19.1 | 3.42 | 0.82 | 5.03 | 6.38 | 5.97 | 5.73 | 1.03 |
|   |       |   |        |   | 300   | 34.6 |      | 19.9 | 3.62 | 0.86 | 5.85 | 6.86 | 6.22 | 6.25 | 1.10 |
|   |       |   |        |   | 485   | 36.0 | 4.00 | 20.5 | 3.72 |      | 5.98 | 6.95 | 6.57 | 6.58 | 1.18 |
|   |       |   |        |   | 500   | 37.6 | 5.26 | 21.8 | 3.93 | 1.13 | 6.35 | 7.33 | 6.87 | 7.00 | 1.29 |
|   |       |   |        |   | 690   | 38.6 | 7.63 | 21.9 | 4.01 | 1.10 | 6.51 | 7.48 | 7.16 | 7.31 | 1.33 |
|   |       |   |        |   | 780   | 39.4 | 7.15 | 22.8 | 4.18 | 1.06 | 7.46 | 7.92 | 7.76 | 7.29 | 1.43 |
|   |       |   |        |   | 890   | 40.8 | 4.42 | 23.3 | 4.21 | 1.19 | 6.89 | 8.10 | 7.76 | 7.99 | 1.48 |
|   |       |   |        |   | 990   | 41.4 | 5.23 | 23.4 | 4.35 | 1.19 | 7.38 | 8.06 | 7.93 | 8.38 | 1.74 |
|   |       |   |        |   | 1240  |      |      |      | 4.67 | 1.30 | 8.21 | 8.99 | 8.68 | 9.18 | 1.66 |
|   |       |   |        |   | 1480  | 45.3 | 4.49 | 26.9 | 4.92 | 1.37 | 8.06 | 9.59 | 9.28 | 9.90 | 1.81 |

## HE2.XLS

|                            |         |   |         |   |       |       |           |      |      |      |      |       |      |      |
|----------------------------|---------|---|---------|---|-------|-------|-----------|------|------|------|------|-------|------|------|
| he2.xls                    |         |   |         |   |       |       |           |      |      |      |      |       |      |      |
| Map #21                    |         |   |         |   |       |       | [pmol/kg] |      |      |      |      |       |      |      |
| ID                         | LAT     |   | LON     |   | Depth | La    | Ce        | Nd   | Sm   | Eu   | Gd   | Dy    | Er   | Yb   |
| MARIANAS (RAMA)            |         |   |         |   | [m]   |       |           |      |      |      |      |       |      |      |
|                            | 18      | N | 145     | E | 15    |       |           | 6.39 | 1.13 |      |      | 2.09  | 1.80 |      |
|                            |         |   |         |   | 28    | 8.32  | 9.91      | 5.12 | 1.01 | 0.33 |      |       | 1.66 | 1.66 |
|                            |         |   |         |   | 490   |       | 8.76      |      | 1.67 |      |      |       |      |      |
|                            |         |   |         |   | 769   |       |           | 16.2 |      |      | 5.41 | 5.88  | 5.50 | 4.76 |
|                            |         |   |         |   | 775   | 26.0  | 9.10      | 13.3 | 2.44 | 0.70 | 4.37 | 4.96  | 5.07 | 5.09 |
|                            |         |   |         |   | 1236  |       | 8.63      | 19.0 | 3.19 | 0.88 |      | 7.40  | 7.46 |      |
|                            |         |   |         |   | 1676  | 38.0  |           | 22.3 | 4.04 | 0.94 |      |       | 9.10 |      |
|                            |         |   |         |   | 2077  | 43.7  |           | 25.8 | 4.67 | 1.28 |      |       | 9.14 |      |
|                            |         |   |         |   | 2121  |       | 8.81      | 26.5 | 4.94 | 1.32 | 7.98 |       | 9.03 |      |
|                            |         |   |         |   | 2350  | 45.4  | 5.17      | 28.1 | 4.88 |      |      |       |      |      |
|                            |         |   |         |   | 2506  |       |           | 29.8 | 5.39 |      |      |       |      |      |
|                            |         |   |         |   | 2554  | 47.8  |           | 30.6 | 5.34 |      |      |       |      |      |
|                            |         |   |         |   | 2739  |       | 9.18      | 29.7 | 5.54 | 1.53 | 8.55 | 9.93  | 9.94 |      |
|                            |         |   |         |   | 2749  | 49.0  | 10.00     | 28.3 | 5.42 | 1.28 | 8.39 | 9.88  | 9.50 |      |
|                            |         |   |         |   | 3109  |       | 8.39      | 30.6 | 5.76 |      | 9.04 | 10.10 |      |      |
|                            |         |   |         |   | 3168  | 51.0  | 3.64      | 31.1 |      |      |      |       |      |      |
|                            |         |   |         |   | 3303  |       | 9.53      | 29.6 | 5.49 | 1.43 |      | 9.95  | 9.78 |      |
|                            |         |   |         |   | 3604  |       | 8.62      | 30.0 | 5.77 |      |      | 10.40 | 9.75 |      |
|                            |         |   |         |   | 3699  |       | 8.70      | 29.9 | 5.58 | 1.36 | 8.60 | 10.30 | 9.71 | 8.99 |
|                            |         |   |         |   | 3828  | 49.50 |           | 31.7 | 5.88 |      |      | 10.60 | 9.87 |      |
|                            |         |   |         |   | 3864  |       | 3.41      | 32.0 |      |      |      |       |      |      |
| EAST PACIFIC RISE (VULCAN) |         |   |         |   |       |       |           |      |      |      |      |       |      |      |
| Sta. 1                     | 22 24.1 | S | 108 31. | W | 1552  |       | 6.31      | 12.4 | 2.05 | 0.53 |      | 4.85  | 5.57 | 4.94 |
| 1                          |         |   |         |   | 2898  |       | 7.48      | 18.3 | 3.15 | 0.89 |      | 6.73  | 7.28 | 7.37 |
| 2                          | 22 15.0 | S | 114 29. | W | 1099  |       |           |      | 1.46 |      |      |       |      |      |
| 2                          |         |   |         |   | 1259  |       |           | 9.41 | 1.52 | 0.42 |      | 4.29  | 4.99 | 4.51 |
| 2                          |         |   |         |   | 1909  |       |           | 14.3 | 2.28 | 0.66 |      | 5.85  | 6.31 |      |
| 2                          |         |   |         |   | 2199  |       |           | 12.0 | 1.90 |      | 3.48 | 5.42  | 6.06 |      |
| 2                          |         |   |         |   | 2641  |       |           | 14.3 | 1.93 |      |      |       |      |      |
| 2                          |         |   |         |   | 2853  |       |           | 15.4 | 2.37 |      |      | 6.68  | 7.18 |      |
| 3                          | 21 22.0 | S | 114 15. | W | 1986  | 28.60 |           |      |      |      |      |       |      |      |
| 3                          |         |   |         |   | 2118  | 28.10 | 7.82      | 13.9 | 2.16 |      |      | 5.78  | 6.34 |      |
| 3                          |         |   |         |   | 2789  | 28.00 | 3.88      | 15.7 |      |      |      |       |      |      |
| 4                          | 20 29.4 | S | 113 51. | W | 1985  |       | 7.70      | 15.0 | 2.51 |      |      | 6.10  | 6.60 |      |
| 4                          |         |   |         |   | 2632  |       | 4.30      | 15.8 | 2.59 |      | 4.73 | 6.11  | 6.87 |      |
| 4                          |         |   |         |   | 2737  |       | 1.38      |      | 2.75 |      | 5.41 | 6.29  | 7.02 | 7.54 |
| 4                          |         |   |         |   | 2785  |       | 3.10      | 15.4 | 2.69 |      |      | 6.44  | 7.18 |      |
| 4                          |         |   |         |   | 3074  |       | 12.7      | 19.8 | 2.82 |      | 6.18 | 6.40  | 7.26 | 8.08 |
| 5                          | 20 09.0 | S | 113 44. | W | 1975  |       |           | 15.2 |      |      |      |       |      |      |

## HE2.XLS

| he2.xls |         |     |         |       |      |      |           |      |      |      |      |      |      |
|---------|---------|-----|---------|-------|------|------|-----------|------|------|------|------|------|------|
| Map #21 |         |     |         |       |      |      | [pmol/kg] |      |      |      |      |      |      |
| ID      | LAT     | LON |         | Depth | La   | Ce   | Nd        | Sm   | Eu   | Gd   | Dy   | Er   | Yb   |
|         |         |     |         |       |      |      |           |      |      |      |      |      |      |
|         |         |     |         |       |      |      |           |      |      |      |      |      |      |
|         |         |     |         |       |      |      |           |      |      |      |      |      |      |
| 5       |         |     |         | 2228  |      | 7.58 | 14.9      | 2.47 |      | 5.47 | 6.05 | 6.67 |      |
| 5       |         |     |         | 2518  |      | 3.61 | 15.0      | 2.42 |      | 4.25 | 6.35 |      |      |
| 5       |         |     |         | 2521  | 24.8 |      |           |      |      |      |      |      |      |
| 5       |         |     |         | 2643  |      |      | 15.0      |      |      |      |      |      |      |
| 5       |         |     |         | 2727  |      |      | 14.7      | 2.60 |      | 4.79 | 6.44 | 6.76 | 7.81 |
| 5       |         |     |         | 2802  |      | 6.27 | 15.9      | 2.82 |      | 5.60 | 6.84 |      |      |
| 5       |         |     |         | 2804  | 28.3 |      |           |      |      |      |      |      |      |
|         |         |     |         |       |      |      |           |      |      |      |      |      |      |
| 6       | 19 24.5 | S   | 113 32. | W     | 2175 |      | 5.25      | 15.6 | 2.65 | 0.74 | 3.48 | 6.16 | 6.35 |
| 6       |         |     |         |       | 2350 |      | 3.21      | 16.3 | 2.77 | 0.75 | 4.21 | 6.33 | 6.97 |
| 6       |         |     |         |       | 2465 |      | 2.75      | 15.7 | 2.70 | 0.91 | 4.67 | 6.21 | 6.96 |
| 6       |         |     |         |       | 2656 |      | 5.80      | 16.7 | 2.82 |      |      |      | 7.37 |
| 6       |         |     |         |       | 2756 |      | 5.99      | 17.4 | 2.85 |      |      | 6.70 | 7.33 |
|         |         |     |         |       |      |      |           |      |      |      |      |      |      |
| 7       | 19 30.0 | S   | 116 34. | W     | 1514 | 21.8 | 8.10      | 12.3 | 1.96 |      |      | 4.77 | 5.69 |
|         |         |     |         |       |      |      |           |      |      |      |      |      |      |
| 9       | 19 29.1 | S   | 123 31. | W     | 2351 |      |           | 12.0 | 2.05 |      |      | 5.60 | 6.53 |
|         |         |     |         |       |      |      |           |      |      |      |      |      |      |
| 11      | 14 29.1 | S   | 123 29. | W     | 1597 | 21.5 | 4.98      | 11.0 | 1.87 | 0.58 | 3.64 | 4.85 | 5.75 |
| 11      |         |     |         |       | 2502 | 29.7 | 2.56      | 13.3 |      |      |      |      | 6.51 |
| 11      |         |     |         |       | 2749 | 24.7 | 1.26      | 12.7 |      |      |      |      |      |
|         |         |     |         |       |      |      |           |      |      |      |      |      |      |
| 12      | 12 08.0 | S   | 123 29. | W     | 2181 |      |           | 13.2 | 2.16 | 0.63 |      | 5.45 | 6.45 |
| 12      |         |     |         |       | 2484 |      | 3.64      | 13.0 | 2.12 | 0.63 |      | 5.54 | 6.60 |
| 12      |         |     |         |       | 2536 |      | 2.67      | 13.4 | 2.07 |      |      | 5.41 | 6.31 |
| 12      |         |     |         |       | 2587 |      | 2.23      | 12.6 | 2.11 |      |      | 5.55 | 7.31 |
| 12      |         |     |         |       | 2683 |      | 1.25      | 12.2 | 2.07 |      | 4.25 | 5.49 | 6.36 |
| ?       |         |     |         |       | 2685 |      |           |      |      |      |      | 5.83 | 6.97 |

| Pacific Seawater Data of Dr. H. Elderfield [in prep.] |       |        |           |      |      |      |      |      |      |      |      |      |
|---|-------|--------|-----------|------|------|------|------|------|------|------|------|------|
| HE3.XLS   |       |        | Map # 21  |      |      |      |      |      |      |      |      |      |
| SURFACE WATER   |       |        | [pmol/kg] |      |      |      |      |      |      |      |      |      |
| STA   | LAT   | LON    | La        | Ce   | Nd   | Sm   | Eu   | Gd   | Dy   | Er   | Yb   | Lu   |
| 349   | 24.25 | 128.40 | 7.68      |      | 6.61 | 1.11 | 0.32 | 1.54 |      | 1.72 | 1.19 | 0.19 |
| 333   | 24.28 | 132.80 | 5.12      | 4.15 | 4.84 | 1.04 | 0.34 | 1.65 | 1.93 | 1.67 | 1.20 | 1.90 |
| 275   | 24.28 | 150.47 |           |      | 5.41 | 1.14 |      |      |      |      |      |      |
| 227   | 24.27 | 167.97 | 5.36      | 3.96 | 4.56 | 0.97 | 0.28 | 1.43 | 2.03 |      | 1.12 | 0.18 |
| 189   | 24.24 | 183.25 | 4.85      | 3.80 | 4.42 | 0.91 | 0.27 | 1.42 | 1.71 | 1.48 | 1.01 | 0.15 |
| 181   | 24.24 | 186.37 |           | 4.45 | 4.64 | 0.92 | 0.26 | 1.51 | 1.70 | 1.52 | 1.03 | 0.16 |
| 173   | 23.40 | 189.26 | 5.26      | 3.76 | 4.61 | 0.89 | 0.26 | 1.32 | 1.69 | 1.47 | 0.97 | 0.14 |
| 157   | 24.10 | 192.83 | 4.59      | 2.88 | 4.15 | 0.85 | 0.29 | 1.38 | 1.65 | 1.46 | 0.94 | 0.15 |
| 150   | 24.50 | 193.27 | 4.55      | 2.70 | 3.94 | 0.80 | 0.27 | 1.37 | 1.63 | 1.46 | 0.97 | 0.16 |
| 140   | 25.48 | 194.27 | 4.92      | 3.03 | 4.29 | 0.86 | 0.25 | 1.39 | 1.66 | 1.46 | 0.95 | 0.14 |
| 128   | 24.89 | 198.75 | 5.38      | 4.02 | 5.02 | 0.98 | 0.28 | 1.54 | 1.71 | 1.52 | 1.00 | 0.18 |
| 116   | 24.24 | 203.27 | 5.14      | 3.73 | 4.71 | 0.96 | 0.29 | 1.50 | 1.74 | 1.49 | 0.98 | 0.16 |
| 100   | 24.25 | 208.69 | 5.81      | 3.52 | 4.87 | 0.97 | 0.24 | 1.27 | 1.78 | 1.54 | 1.00 | 0.15 |
| 88  | 24.23 | 213.07 | 5.86      | 3.39 | 4.71 | 0.96 | 0.27 | 1.53 | 1.75 | 1.52 | 1.00 | 0.16 |
| 81  | 24.23 | 215.97 | 7.10      | 5.07 | 5.82 | 1.13 | 0.32 | 1.75 | 2.00 | 1.69 | 1.08 | 0.17 |
| 62  | 24.25 | 224.38 | 7.05      | 4.00 | 5.24 | 1.00 | 0.29 | 1.20 | 1.85 | 1.62 | 1.06 | 0.17 |
| 56  | 24.25 | 226.76 | 8.43      | 4.76 | 6.41 | 1.26 | 0.33 | 1.88 | 2.07 | 1.74 | 1.12 | 0.18 |
| 46  | 25.20 | 231.20 | 11.5      | 5.94 | 7.63 | 1.36 | 0.36 | 2.11 | 2.16 | 1.84 | 1.20 | 0.18 |
| 31  | 29.05 | 236.13 | 12.6      | 6.18 | 8.69 | 1.60 | 0.43 | 2.20 | 2.48 | 2.04 | 1.28 | 0.19 |
| 28  | 30.04 | 237.41 | 14.1      | 7.24 | 10.3 | 1.88 | 0.52 | 2.55 | 2.72 | 2.17 | 1.40 | 0.21 |
| 26  | 30.49 | 237.98 | 12.4      | 5.89 | 8.34 | 1.47 | 0.40 | 2.25 | 3.06 |      | 1.21 | 0.21 |
| 24  | 30.89 | 238.76 | 12.3      | 5.85 | 8.16 | 1.51 | 0.41 | 2.28 | 2.44 | 1.98 | 1.24 | 0.19 |
| 22  | 31.24 | 239.45 | 15.7      | 8.54 | 10.3 | 1.83 | 0.50 | 2.53 | 2.90 | 2.52 | 1.65 | 0.29 |
| 18  | 31.67 | 240.29 | 14.3      | 6.69 | 9.75 | 1.76 | 0.47 | 2.58 | 2.76 | 2.22 | 1.47 | 0.22 |
| 16  | 31.77 | 240.47 | 21.9      |      | 13.8 | 2.11 | 0.52 | 2.69 | 2.74 | 2.21 | 1.42 | 0.22 |
| T8  | 55.50 | 147.5  | 11.4      | 4.34 | 6.76 | 1.14 | 0.35 | 1.97 | 2.50 | 2.33 | 1.71 | 0.29 |
| T7  | 50.00 | 145.0  | 12.2      | 3.90 | 7.00 | 1.17 | 0.33 | 2.07 | 2.59 | 2.52 | 1.93 | 0.32 |
| T6  | 45.00 | 142.9  | 12.3      | 3.32 | 7.46 | 1.34 | 0.36 | 2.10 | 2.67 | 2.41 | 1.70 | 0.33 |
| T5  | 39.60 | 140.8  | 7.53      |      | 5.08 | 0.87 | 0.20 | 1.37 | 1.55 | 1.41 | 0.82 | 0.13 |
| T4  | 33.00 | 139.0  | 5.78      |      | 4.16 | 0.76 | 0.21 |      | 1.51 | 1.43 | 0.88 | 0.12 |

**Table A10: Handbook section 6.1. Arctic Ocean seawater**

File name: ARC\_CONC.XLS. Concentration of RE in Arctic Ocean  
seawater (North Atlantic sector)

| Arctic Ocean (North Atlantic side)     |      |      |     |                |     |      |      |     |     |        |
|--|------|------|-----|----------------|-----|------|------|-----|-----|--------|
| arc_conc.xls                           |      |      |     |                |     |      |      |     |     |        |
| unfiltered samples                     |      |      |     | CONC = pmol/kg |     |      |      |     |     |        |
| Depth                                  | La   | Ce   | Pr  | Nd             | Sm  | Gd   | Dy   | Er  | Yb  | Ce/Ce* |
| -                                      | -    | -    | -   | -              | -   | -    | -    | -   | -   | -      |
| Westerlund & Ohman (1992)              |      |      |     |                |     |      |      |     |     |        |
| Sta 296 (81 48.6'N & 31 35.6'E) 3011 m |      |      |     |                |     |      |      |     |     |        |
| 10                                     | 34.8 | 38.6 | 7.8 | 28.5           | 4.7 | 10.2 | 6.8  | 6.0 | 5.2 | 0.57   |
| 20                                     | 20.3 | 12.1 | 4.3 | 17.4           | 4.0 | 5.7  | 6.2  | 4.8 | 4.0 | 0.30   |
| 100                                    | 18.8 | 10.0 | 4.3 | 16.0           | 4.7 | 5.1  | 8.0  | 4.8 | 5.2 | 0.27   |
| 200                                    | 20.3 | 12.1 | 4.3 | 16.7           | 3.3 | 5.7  | 5.6  | 3.6 | 5.2 | 0.30   |
| 300                                    | 24.6 | 21.4 | 5.0 | 16.7           | 4.7 | 6.4  | 7.4  | 3.6 | 4.0 | 0.47   |
| 400                                    | 23.2 | 12.1 | 4.3 | 19.4           | 2.7 | 3.8  | 6.2  | 4.2 | 2.9 | 0.27   |
| 500                                    | 24.6 | 20.0 | 5.0 | 25.0           | 3.3 | 5.1  | 6.2  | 4.8 | 4.6 | 0.39   |
| 600                                    | 25.4 | 20.7 | 5.7 | 24.3           | 4.0 | 6.4  | 9.3  | 4.2 | 5.2 | 0.40   |
| Sta 310 (82 08.1'N & 31 58.0'E) 3029 m |      |      |     |                |     |      |      |     |     |        |
| 600                                    | 22.5 | 12.9 | 4.3 | 22.9           | 4.7 | 7.0  | 5.6  | 4.8 | 5.2 | 0.27   |
| 1000                                   | 21.0 | 14.3 | 3.5 | 19.4           | 3.3 | 6.4  | 4.9  | 4.8 | 4.0 | 0.34   |
| 1500                                   | 21.0 | 12.1 | 5.0 | 20.1           | 3.3 | 5.7  | 6.8  | 4.2 | 5.8 | 0.28   |
| 2000                                   | 18.8 | 11.4 | 3.5 | 19.4           | 3.3 | 4.5  | 5.6  | 5.4 | 4.0 | 0.29   |
| 2500                                   | 22.5 | 8.6  | 5.0 | 20.1           | 4.0 | 4.5  | 6.2  | 4.8 | 4.0 | 0.19   |
| 2800                                   | 23.9 | 12.1 | 4.3 | 23.6           | 4.7 | 4.5  | 7.4  | 4.8 | 4.6 | 0.24   |
| Sta 358 (84 01.5'N & 30 34.0'E) 4040 m |      |      |     |                |     |      |      |     |     |        |
| 10                                     | 37.0 | 16.4 | 6.4 | 30.6           | 5.3 | 8.9  | 8.0  | 6.6 | 5.2 | 0.23   |
| 20                                     | 40.6 | 15.7 | 7.8 | 29.2           | 4.7 | 11.5 | 9.3  | 6.0 | 4.6 | 0.21   |
| 300                                    | 21.0 | 10.0 | 4.3 | 18.1           | 2.7 | 5.1  | 6.2  | 4.8 | 4.0 | 0.24   |
| 800                                    | 21.0 | 10.0 | 3.5 | 19.4           | 2.7 | 4.5  | 3.7  | 4.8 | 3.5 | 0.23   |
| 1300                                   | 21.7 | 9.3  | 3.5 | 14.6           | 2.7 | 5.1  | 5.6  | 4.8 | 4.0 | 0.23   |
| 1800                                   | 23.2 | 8.6  | 3.5 | 16.0           | 4.0 | 5.7  | 4.9  | 4.8 | 4.6 | 0.20   |
| 2300                                   | 27.5 | 14.3 | 5.0 | 20.1           | 4.0 | 6.4  | 4.9  | 4.8 | 4.0 | 0.28   |
| 3000                                   | 23.9 | 5.7  | 4.3 | 17.4           | 3.3 | 5.1  | 5.6  | 5.4 | 4.0 | 0.13   |
| 3500                                   | 31.2 | 15.0 | 5.0 | 23.6           | 4.0 | 5.7  | 6.2  | 4.8 | 4.0 | 0.25   |
| Sta 362 (85 04.0'N & 29 21.3'E) 4037 m |      |      |     |                |     |      |      |     |     |        |
| 10                                     | 30.4 | 15.0 | 5.7 | 27.1           | 4.7 | 8.3  | 8.6  | 7.2 | 6.4 | 0.25   |
| 20                                     | 34.1 | 16.4 | 5.7 | 26.4           | 5.3 | 7.6  | 8.6  | 7.2 | 6.4 | 0.25   |
| 50                                     | 26.1 | 14.3 | 5.0 | 27.8           | 4.7 | 5.7  | 7.4  | 6.0 | 5.2 | 0.26   |
| 100                                    | 31.2 | 12.1 | 5.0 | 26.4           | 4.0 | 7.0  | 8.6  | 7.2 | 6.4 | 0.20   |
| 200                                    | 21.0 | 9.3  | 3.5 | 16.7           | 3.3 | 5.1  | 6.2  | 5.4 | 4.0 | 0.23   |
| 400                                    | 23.9 | 10.0 | 4.3 | 18.8           | 3.3 | 7.0  | 6.8  | 5.4 | 4.6 | 0.22   |
| 700                                    | 18.8 | 9.3  | 3.5 | 16.0           | 3.3 | 4.5  | 5.6  | 3.6 | 3.5 | 0.25   |
| Sta 370 (85 54.0'N & 22 46.4'E) 4552 m |      |      |     |                |     |      |      |     |     |        |
| 10                                     | 31.9 | 15.0 | 5.7 | 27.1           | 6.7 | 7.6  | 10.5 | 7.2 | 7.5 | 0.24   |
| 20                                     | 30.4 | 14.3 | 6.4 | 22.9           | 5.3 | 9.6  | 11.1 | 9.0 | 7.5 | 0.25   |
| 30                                     | 33.3 | 15.7 | 5.7 | 27.1           | 6.0 | 7.0  | 8.6  | 7.2 | 8.1 | 0.24   |
| 40                                     | 34.1 | 16.4 | 6.4 | 28.5           | 6.0 | 8.9  | 9.3  | 7.2 | 8.1 | 0.24   |
| 50                                     | 34.1 | 12.9 | 5.7 | 29.2           | 5.3 | 7.6  | 9.3  | 6.0 | 7.5 | 0.19   |
| 60                                     | 30.4 | 12.9 | 6.4 | 28.5           | 5.3 | 7.0  | 8.6  | 7.2 | 6.4 | 0.21   |
| 70                                     | 33.3 | 14.3 | 5.7 | 25.0           | 5.3 | 8.9  | 9.3  | 6.6 | 6.4 | 0.23   |
| 80                                     | 36.2 | 16.4 | 6.4 | 28.5           | 5.3 | 8.9  | 7.4  | 6.6 | 6.4 | 0.23   |
| 90                                     | 37.7 | 17.9 | 6.4 | 29.9           | 5.3 | 9.6  | 9.3  | 6.6 | 6.4 | 0.25   |
| 100                                    | 29.7 | 13.6 | 5.7 | 30.6           | 4.7 | 8.9  | 8.6  | 6.0 | 6.4 | 0.22   |
| 110                                    | 29.0 | 12.1 | 4.3 | 23.6           | 5.3 | 7.0  | 8.0  | 6.0 | 6.4 | 0.21   |

| unfiltered samples                     |      | CONC = pmol/kg |     |      |     |      |      |     |     |        |
|--|------|----------------|-----|------|-----|------|------|-----|-----|--------|
| Depth                                  | La   | Ce             | Pr  | Nd   | Sm  | Gd   | Dy   | Er  | Yb  | Ce/Ce* |
| -                                      | -    | -              | -   | -    | -   | -    | -    | -   | -   | -      |
| 120                                    | 28.3 | 13.6           | 5.0 | 21.5 | 4.7 | 6.4  | 6.8  | 5.4 | 5.2 | 0.25   |
| 130                                    | 26.1 | 11.4           | 5.0 | 23.6 | 4.7 | 8.3  | 7.4  | 5.4 | 5.8 | 0.22   |
| 140                                    | 28.3 | 13.6           | 5.0 | 20.8 | 4.7 | 7.0  | 9.3  | 6.0 | 5.8 | 0.25   |
| 150                                    | 42.0 | 61.4           | 9.9 | 39.6 | 4.7 | 13.4 | 9.9  | 5.4 | 6.9 | 0.71   |
| 160                                    | 24.6 | 10.7           | 4.3 | 25.0 | 4.7 | 8.3  | 8.0  | 6.0 | 5.8 | 0.21   |
| 180                                    | 27.5 | 12.1           | 5.0 | 22.9 | 4.0 | 6.4  | 8.6  | 6.0 | 5.2 | 0.22   |
| 190                                    | 30.4 | 12.9           | 5.7 | 22.2 | 4.7 | 5.1  | 8.6  | 4.8 | 4.6 | 0.23   |
| 250                                    | 23.9 | 11.4           | 4.3 | 18.8 | 3.3 | 7.6  | 7.4  | 5.4 | 4.6 | 0.25   |
| 300                                    | 22.5 | 10.0           | 4.3 | 18.8 | 3.3 | 5.1  | 5.6  | 4.8 | 4.6 | 0.23   |
| 400                                    | 25.4 | 12.1           | 5.0 | 21.5 | 4.7 | 6.4  | 8.0  | 6.0 | 5.8 | 0.24   |
| 500                                    | 23.2 | 10.0           | 4.3 | 16.7 | 4.0 | 6.4  | 6.2  | 6.0 | 4.6 | 0.23   |
| 800                                    | 23.9 | 14.3           | 4.3 | 21.5 | 4.0 | 5.7  | 6.2  | 4.2 | 4.6 | 0.30   |
| 1000                                   | 21.0 | 10.0           | 4.3 | 16.7 | 3.3 | 5.1  | 6.2  | 4.8 | 4.6 | 0.25   |
| Sta 371 (86 04.3'N & 21 59.2'E) 3545 m |      |                |     |      |     |      |      |     |     |        |
| 10                                     | 37.7 | 15.7           | 7.1 | 36.1 | 6.0 | 9.6  | 8.6  | 6.6 | 8.1 | 0.20   |
| 20                                     | 34.8 | 15.0           | 6.4 | 34.0 | 7.3 | 8.9  | 8.6  | 7.8 | 6.9 | 0.21   |
| 500                                    | 18.8 | 8.6            | 3.5 | 22.2 | 4.0 | 7.0  | 4.9  | 4.2 | 2.9 | 0.21   |
| 800                                    | 21.0 | 8.6            | 3.5 | 22.2 | 2.7 | 6.4  | 5.6  | 5.4 | 4.6 | 0.19   |
| 1000                                   | 24.6 | 9.3            | 4.3 | 19.4 | 3.3 | 7.0  | 6.2  | 4.2 | 4.0 | 0.20   |
| 1500                                   | 23.2 | 7.1            | 3.5 | 18.8 | 3.3 | 5.7  | 6.8  | 4.8 | 4.6 | 0.16   |
| 2100                                   | 26.1 | 8.6            | 4.3 | 18.8 | 3.3 | 5.1  | 4.3  | 4.2 | 4.6 | 0.18   |
| 2800                                   | 23.9 | 8.6            | 4.3 | 18.1 | 3.3 | 5.1  | 3.7  | 3.6 | 3.5 | 0.19   |
| Sta 376 (85 22.4'N & 21 58.2'E) 2900 m |      |                |     |      |     |      |      |     |     |        |
| 10                                     | 37.0 | 14.3           | 7.1 | 40.3 | 6.7 | 9.6  | 12.3 | 8.4 | 6.4 | 0.18   |
| 20                                     | 34.1 | 13.6           | 5.7 | 27.8 | 5.3 | 7.6  | 10.5 | 9.6 | 6.4 | 0.20   |
| 50                                     | 31.2 | 13.6           | 5.7 | 28.5 | 4.0 | 8.3  | 9.3  | 4.8 | 5.8 | 0.22   |
| 100                                    | 31.2 | 13.6           | 5.7 | 27.1 | 4.7 | 9.6  | 8.6  | 6.6 | 5.8 | 0.22   |
| 200                                    | 23.2 | 18.6           | 5.0 | 21.5 | 2.7 | 6.4  | 7.4  | 6.0 | 3.5 | 0.39   |
| 300                                    | 23.9 | 10.7           | 3.5 | 18.1 | 4.7 | 5.1  | 7.4  | 4.8 | 4.6 | 0.23   |
| 400                                    | 23.9 | 10.0           | 4.3 | 21.5 | 4.7 | 7.6  | 7.4  | 5.4 | 4.0 | 0.21   |
| 600                                    | 19.6 | 7.9            | 1.4 | 15.3 | 3.3 | 3.8  | 4.3  | 4.8 | 2.9 | 0.21   |
| 700                                    | 19.6 | 9.3            | 2.1 | 19.4 | 3.3 | 4.5  | 5.6  | 4.8 | 4.0 | 0.23   |
| Sta 393 (82 50.0'N & 17 14.5'E) 3258 m |      |                |     |      |     |      |      |     |     |        |
| 10                                     | 23.2 | 12.1           | 2.1 | 16.7 | 4.0 | 7.0  | 4.3  | 4.2 | 3.5 | 0.28   |
| 20                                     | 21.7 | 10.7           | 2.1 | 20.1 | 4.7 | 7.6  | 6.2  | 6.0 | 4.6 | 0.24   |
| 500                                    | 19.6 | 10.0           | 1.4 | 22.2 | 4.0 | 7.0  | 4.3  | 3.6 | 4.0 | 0.23   |
| 1000                                   | 22.5 | 8.6            | 1.4 | 19.4 | 2.7 | 5.7  | 4.9  | 6.0 | 3.5 | 0.19   |
| 1400                                   | 19.6 | 8.6            | 1.4 | 16.7 | 4.0 | 6.4  | 5.6  | 4.2 | 4.6 | 0.22   |
| 1800                                   | 21.7 | 7.9            | 4.3 | 20.8 | 3.3 | 3.8  | 4.9  | 4.8 | 5.2 | 0.18   |
| 2200                                   | 22.5 | 7.1            | 3.5 | 18.8 | 4.0 | 6.4  | 4.9  | 4.2 | 4.6 | 0.16   |
| Sta 364 (85 22.0'N & 26 09.8'E) 3668 m |      |                |     |      |     |      |      |     |     |        |
| 10                                     | 41.3 | 22.9           | 7.8 | 36.8 | 7.3 | 9.6  | 9.9  | 9.0 | 6.4 | 0.28   |
| 20                                     | 40.6 | 25.0           | 7.1 | 38.9 | 7.3 | 9.6  | 8.6  | 7.8 | 8.1 | 0.30   |
| Sta 365 (85 30.7'N & 25 14.8'E) 3089 m |      |                |     |      |     |      |      |     |     |        |
| 10                                     | 32.6 | 15.7           | 5.7 | 25.0 | 4.0 | 7.0  | 8.6  | 7.8 | 5.8 | 0.25   |
| 20                                     | 34.8 | 15.7           | 6.4 | 29.9 | 5.3 | 8.3  | 8.6  | 7.8 | 6.4 | 0.23   |

**Table A11: Handbook section 6.1 and 7.1. Mediterranean Sea.**

File name: MED\_CONC.XLS. Concentration of RE in the Mediterranean Sea, including the anoxic brines of Bannock Basin

| Mediterranean Sea                                      |      |       |      |      |       |      |      |      |      |       |        |
|--|------|-------|------|------|-------|------|------|------|------|-------|--------|
| med-conc.xls   |      |       |      |      |       |      |      |      |      |       |        |
| CONC = pmol/kg   |      |       |      |      |       |      |      |      |      |       |        |
| Depth  | La   | Ce    | Nd   | Sm   | Eu    | Gd   | Dy   | Er   | Yb   | Lu    | Ce/Ce* |
| -  | -    | -     | -    | -    | -     | -    | -    | -    | -    | -     | -      |
| Greaves et. al. (1991) Map #24 0.4 um filtered samples |      |       |      |      |       |      |      |      |      |       |        |
| Sta 10404 (34 22.0°N & 12 29.0°W)                      |      |       |      |      |       |      |      |      |      |       |        |
| 13   | 14.4 | 12.30 | 12.4 | 2.54 | 0.673 | 3.74 | 4.49 | 3.83 | 3.32 | 0.522 | 0.43   |
| 33   |      |       |      |      |       |      | 4.51 | 3.78 | 3.20 | 0.500 |        |
| 58   | 14.2 | 12.10 | 12.6 | 2.60 | 0.692 | 3.63 | 4.67 | 3.98 | 3.39 | 0.535 | 0.43   |
| 108  | 14.1 | 12.10 | 12.8 | 2.66 | 0.698 |      | 4.68 | 3.93 | 3.47 | 0.538 | 0.43   |
| 208  | 16.3 | 9.39  | 14.0 | 2.88 | 0.720 | 3.72 | 4.98 | 4.22 | 3.67 | 0.603 | 0.29   |
| 505  | 21.4 | 9.95  | 17.2 | 3.32 | 0.823 | 4.17 | 5.13 | 4.35 | 4.03 | 0.642 | 0.24   |
| 708  | 20.3 | 6.54  | 16.1 | 3.28 | 0.830 | 3.76 | 5.37 | 4.59 | 4.21 | 0.706 | 0.17   |
| 807  | 24.0 | 7.33  | 17.2 | 3.40 | 0.875 | 4.70 | 5.52 | 4.66 | 4.46 | 0.701 | 0.16   |
| 827  | 19.8 | 4.29  | 15.3 | 3.14 | 0.837 | 4.62 | 5.58 | 4.75 | 4.45 | 0.719 | 0.11   |
| 869  | 20.4 | 5.49  | 15.9 | 3.27 | 0.866 | 4.46 | 5.66 | 4.84 | 4.48 | 0.737 | 0.14   |
| 913  | 20.3 | 5.54  | 16.3 | 3.38 | 0.901 | 4.90 | 5.76 | 4.91 | 4.57 | 0.765 | 0.14   |
| 1013   | 20.8 |       | 16.4 | 3.39 | 0.905 | 4.94 | 5.71 | 5.00 |      | 0.769 |        |
| 1013   | 21.3 | 6.59  | 16.6 | 3.40 | 0.914 |      | 6.21 | 5.04 | 4.70 | 0.763 | 0.16   |
| 1111   | 20.2 | 5.53  | 16.4 | 3.45 | 0.916 | 5.26 | 5.95 | 5.07 | 4.65 | 0.785 | 0.14   |
| 1212   |      | 4.22  | 16.3 | 3.48 | 0.937 | 5.11 | 6.13 | 5.16 | 4.76 | 0.809 |        |
| 1212   | 21.0 | 5.47  | 16.7 | 3.55 |       |      | 6.10 | 5.12 | 4.78 | 0.810 | 0.13   |
| 1307   | 20.5 | 4.76  | 16.6 | 3.52 | 0.944 | 5.10 | 6.16 | 5.17 | 4.69 | 0.813 | 0.12   |
| 1307   |      |       | 17.1 | 3.62 |       | 4.93 | 6.10 | 5.07 | 4.96 | 0.798 |        |
| 1610   | 21.3 | 3.84  | 16.2 | 3.34 | 0.885 |      | 5.77 | 4.96 | 4.74 | 0.789 | 0.09   |
| 1812   | 21.8 | 4.58  | 16.2 | 3.25 | 0.860 | 4.82 | 5.78 | 4.85 | 4.70 | 0.786 | 0.11   |
| 2019   |      |       | 18.2 | 3.37 | 0.834 | 4.74 | 6.00 | 4.88 | 4.83 | 0.810 |        |
| Sta 10708 (40 15.0°N & 05 22.0°E)                      |      |       |      |      |       |      |      |      |      |       |        |
| 25   | 26.1 | 20.90 | 24.4 | 5.53 | 1.470 | 7.99 | 8.76 | 6.78 | 6.11 | 1.010 |        |
| 100  | 28.1 | 15.90 | 25.8 | 5.86 | 1.570 | 8.33 | 9.50 | 7.50 | 6.86 | 1.090 |        |
| 175  | 29.0 | 13.60 | 26.2 | 5.98 | 1.600 | 8.30 |      | 7.63 | 7.00 | 1.140 |        |
| 175  |      | 14.90 | 26.3 | 6.03 | 1.610 | 8.50 | 9.77 | 7.59 | 7.03 | 1.160 |        |
| 250  | 27.9 | 15.90 | 25.4 | 5.82 | 1.560 | 8.13 | 9.72 | 7.64 | 7.05 | 1.150 |        |
| 400  | 25.2 | 8.14  | 23.5 | 5.46 | 1.480 | 7.92 | 8.96 | 7.40 | 6.98 | 1.070 |        |
| 1200   |      | 7.27  | 22.8 | 5.26 | 1.440 | 7.71 | 8.86 | 7.00 | 6.58 | 1.070 |        |
| 1550   |      | 6.17  | 21.9 | 5.14 | 1.420 | 7.42 | 8.68 | 6.83 | 6.45 | 1.050 |        |
| 1950   | 22.6 | 6.44  | 20.7 | 4.95 | 1.360 | 7.08 | 8.43 | 6.74 | 6.36 | 1.050 |        |
| 2350   | 22.9 | 6.60  | 22.0 | 5.05 | 1.390 | 7.38 | 8.26 | 6.87 | 6.57 | 1.050 |        |
| 2750   | 22.0 | 8.78  | 20.9 | 4.91 | 1.330 | 7.03 | 8.37 | 6.80 | 6.47 | 1.050 |        |

| <b>Spivak &amp; Wasserburg (1988) Map # 24 0.4 um filtered samples</b> |      |   |  |  |  |  |  |
|--|------|---|--|--|--|--|--|
| Med-15 (36 04.8'N & 05 59.8')  | Nd   |   |  |  |  |  |  |
| 75   | 14.1 |   |  |  |  |  |  |
| 150  | 27.9 |   |  |  |  |  |  |
| 250  | 28.0 |   |  |  |  |  |  |
| 400  | 32.4 |   |  |  |  |  |  |
| 450  | 30.3 |   |  |  |  |  |  |
| 500  | 26.6 |   |  |  |  |  |  |
| Med-4 (36 04.81'N & 05 59.83'W)  |      |   |  |  |  |  |  |
| 20   | 30.8 |   |  |  |  |  |  |
| Med-9 (35 37.2'N & 06 03.8'W)  |      |   |  |  |  |  |  |
| 2  | 32.2 |   |  |  |  |  |  |
| ALB-I (35 55'N & 04 27'W)  |      |   |  |  |  |  |  |
| 0  | 16.4 |   |  |  |  |  |  |
| EMED-I   |      |   |  |  |  |  |  |
| 0  | 31.5 |   |  |  |  |  |  |
| TTO-TAS 80 (27 50.0'N & 30 32.0'W)                                     |      |   |  |  |  |  |  |
| 0  | 13.8 | Station Outside of Med. Sea in North Atlantic Map # 9 |  |  |  |  |  |
| 389  | 13.9 |   |  |  |  |  |  |
| 1152   | 17.9 |   |  |  |  |  |  |
| 1260   | 16.3 |   |  |  |  |  |  |
| 1990   | 17.1 |   |  |  |  |  |  |
| 2984   | 20.2 |   |  |  |  |  |  |
| 4724   | 26.3 |   |  |  |  |  |  |
|  |      |   |  |  |  |  |  |
|  |      |   |  |  |  |  |  |
|  |      |   |  |  |  |  |  |
| <b>Henry et al. (1994) western Mediterranean Sea,</b>                  |      |   |  |  |  |  |  |
| Sta. Villefranche  |      | <b>unfiltered samples</b>                             |  |  |  |  |  |
| M 40m  | 27.5 |   |  |  |  |  |  |
| 80   | 30.2 |   |  |  |  |  |  |
| 200  | 26.2 |   |  |  |  |  |  |
| 500  | 29.5 |   |  |  |  |  |  |
| 2000   | 37.7 |   |  |  |  |  |  |
|  |      |   |  |  |  |  |  |
| O40  | 54.1 |   |  |  |  |  |  |
| 80   | 35.7 |   |  |  |  |  |  |
| 1000   | 32.0 |   |  |  |  |  |  |
| Sta. BAOR, deep  |      | 26.4  |  |  |  |  |  |

|              |  |                                |           |           |           |           |           |           |           |           |  |
|--------------|--|--------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--|
|              |  |                                |           |           |           |           |           |           |           |           |  |
|              |  |                                |           |           |           |           |           |           |           |           |  |
|              | <b>Schijf et al. (1995): Anoxic brines of Brannock Basin Map #25</b> |                                |           |           |           |           |           |           |           |           |  |
|              |  | <b>0.4 um filtered samples</b> |           |           |           |           |           |           |           |           |  |
| <b>Depth</b> | <b>La</b>  | <b>Ce</b>                      | <b>Nd</b> | <b>Sm</b> | <b>Eu</b> | <b>Gd</b> | <b>Dy</b> | <b>Er</b> | <b>Yb</b> | <b>Lu</b> |  |
| 2998         | 24.3   | 10.1                           | 21.2      | 4.79      | 1.31      |           |           |           | 6.78      |           |  |
| 3300         | 26.9   | 12.0                           | 23.4      | 5.43      | 1.48      |           |           |           | 7.25      | 1.02      |  |
| 3306         | 24.9   | 10.2                           | 21.9      | 4.92      | 1.40      |           |           | 7.32      | 7.07      | 1.06      |  |
| 3310         |  | 10.8                           | 23.0      | 5.19      | 1.44      |           |           |           | 7.14      |           |  |
| 3315         | 25.5   | 10.1                           | 23.0      | 5.10      | 1.43      |           |           |           | 7.09      |           |  |
| 3323         | 1038   | 3750                           | 970       | 179       | 42.9      | 197       | 144       | 94.3      | 75.9      | 9.27      |  |
| 3329         | 416  | 1523                           | 360       | 75.0      | 19.2      |           |           | 48.0      | 45.5      | 7.09      |  |
| 3359         | 292  | 860                            | 212       | 43.3      | 11.4      |           |           | 29.7      |           | 3.64      |  |
| 3377         | 394  | 905                            | 221       | 46.2      | 11.8      | 56.6      | 48.2      | 27.4      |           | 3.4       |  |
| 3420         | 224  | 564                            | 145       | 32.0      | 8.35      |           |           |           | 24.8      | 2.86      |  |
| 3470         | 178  | 431                            | 114       | 25.3      |           |           |           | 19.4      | 17.4      | 2.63      |  |
| 3470         | 141  | 425                            | 111       | 24.3      | 6.44      |           |           |           |           |           |  |
| 3491         | 193  | 476                            | 128       | 27.4      | 7.47      |           |           | 22.0      | 20.6      | 2.75      |  |
| 3529         | 322  | 616                            | 219       | 45.3      | 12.0      |           |           | 41.8      | 32.3      |           |  |
| 3580         | 310  | 638                            | 234       | 48.6      | 12.6      |           |           | 42.8      | 34.5      | 3.58      |  |
| 3628         | 364  | 599                            | 216       | 44.8      | 12.0      |           |           | 39.8      | 31.5      | 3.31      |  |
| 3730         | 326  | 671                            | 240       | 48.4      | 12.5      |           |           |           |           |           |  |
| 3730         | 318  | 603                            | 220       | 45.2      | 11.4      | 55.1      |           | 35.6      |           | 3.73      |  |
| 3784         | 330  | 582                            | 210       | 43.5      | 11.7      |           |           | 34.0      | 32.3      | 3.79      |  |

## **Table A12: Handbook section 7.1. Anoxic Basins**

File name: BLACKSEA.XLS. Concentration of RE in the Black Sea

File name: SAANICH.XLS. Dissolved and suspended concentrations of RE in Saanich Inlet, British Columbia, Canada

File name: CARIACO.XLS. Concentration of RE in the Cariaco Trench.

See also Chesapeake Bay data in Table A3 files

| Anoxic Basins                   |      |      |                         |      |      |      |       |      |      |      |        |
|---------------------------------|------|------|-------------------------|------|------|------|-------|------|------|------|--------|
| blacksea.xls                    |      |      |                         |      |      |      |       |      |      |      |        |
| Black Sea Map # 25              |      |      |                         |      |      |      |       |      |      |      |        |
| CONC = pmol/kg                  |      |      |                         |      |      |      |       |      |      |      |        |
| Depth                           | La   | Ce   | Nd                      | Sm   | Eu   | Gd   | Dy    | Er   | Yb   | Lu   | Ce/Ce* |
|                                 | -    | -    | -                       | -    | -    | -    | -     | -    | -    |      | -      |
| Schijf, et. al. (1991)          |      |      | 0.2 um filtered samples |      |      |      |       |      |      |      |        |
| Sta BSK2 (43 N & 34 E)          |      |      |                         |      |      |      |       |      |      |      |        |
| 0                               |      | 30.8 | 23.2                    | 5.52 | 1.45 |      |       | 13.2 | 9.70 | 1.48 |        |
| 30                              | 33.1 | 16.5 | 21.8                    | 4.76 |      | 7.40 | 10.00 | 9.2  |      | 1.28 | 0.27   |
| 40                              |      | 18.1 | 23.3                    | 5.04 | 1.38 |      |       | 8.8  |      | 1.37 |        |
| 40                              |      | 18.7 | 23.6                    | 5.03 | 1.36 |      |       | 9.0  |      |      |        |
| 50                              |      | 12.7 | 22.8                    | 4.42 | 1.24 |      |       | 8.5  | 7.50 | 1.30 |        |
| 60                              |      | 5.36 | 16.9                    | 3.56 | 1.04 |      |       |      |      |      |        |
| 70                              | 28.4 | 6.03 | 16.9                    | 3.69 |      |      |       |      | 7.10 |      | 0.12   |
| 85                              | 19.4 | 3.54 | 12.2                    | 2.58 | 0.76 | 4.20 | 6.40  | 6.6  |      | 1.11 | 0.10   |
| 100                             |      | 3.30 | 7.35                    | 1.55 | 0.48 |      |       | 5.5  | 5.80 | 0.85 |        |
| 107                             | 16.8 | 3.95 | 7.23                    | 1.44 | 0.45 |      | 4.20  | 5.3  | 5.50 | 0.95 | 0.14   |
| 110                             | 17.3 | 8.66 | 10.7                    | 2.31 | 0.71 |      | 5.80  | 6.2  | 6.40 | 1.06 | 0.28   |
| 115                             |      | 19.2 | 15.7                    | 3.29 | 0.96 |      |       | 8.1  | 8.30 | 1.21 |        |
| 130                             |      | 28.9 | 17.3                    | 3.50 |      | 5.70 | 7.40  |      |      | 1.45 |        |
| 160                             | 56.4 | 109  | 45.0                    | 9.16 | 2.56 |      |       | 12.7 | 12.2 | 1.67 | 1.00   |
| 175                             |      | 136  | 54.6                    | 11.1 | 3.10 |      |       |      | 14.1 |      |        |
| 200                             | 64.5 | 154  | 63.1                    | 12.7 | 3.51 |      |       |      | 14.8 | 1.70 | 1.15   |
| 225                             |      | 180  | 70.9                    | 14.7 | 4.15 |      |       |      | 16.1 |      |        |
| 250                             | 90.3 | 197  | 77.5                    |      | 4.16 |      |       |      |      | 2.06 | 1.10   |
| 300                             |      | 205  | 80.5                    |      |      |      |       |      |      |      |        |
| 400                             | 89.7 | 198  | 80.7                    | 16.0 | 4.50 |      |       | 16.8 | 17.6 | 1.99 | 1.10   |
| 500                             | 93.4 | 185  | 75.0                    | 15.1 | 4.00 |      |       | 15.6 | 14.9 | 1.90 | 1.02   |
| 700                             |      | 159  | 67.5                    | 13.7 | 3.75 |      |       |      | 14.5 |      |        |
| 1050                            |      | 122  | 54.5                    | 11.4 | 3.01 |      |       |      | 11.8 |      |        |
| 1350                            | 68.8 | 114  | 51.7                    | 10.2 | 2.84 |      |       | 12.0 |      | 1.46 | 0.87   |
| 1600                            |      | 110  | 51.4                    | 10.2 | 2.77 |      |       | 11.8 | 11.2 | 1.44 |        |
| 1800                            | 69.0 | 100  | 48.4                    | 9.86 | 2.69 |      |       | 11.1 | 10.9 | 1.41 | 0.78   |
| 2172                            | 68.1 | 102  | 47.0                    | 9.85 | 2.69 |      |       | 11.0 | 11.0 | 1.36 | 0.81   |
| German et. al. (1991)           |      |      | 0.4 um filtered samples |      |      |      |       |      |      |      |        |
| Sta BS3-6 (43 04' N & 34 00' E) |      |      |                         |      |      |      |       |      |      |      |        |
| 6                               | 18.9 | 22.2 | 18.6                    | 4.25 | 1.27 | 7.29 | 10.1  | 9.23 | 9.15 | 1.56 | 0.57   |
| 15                              | 19.0 | 18.4 | 18.6                    | 4.23 | 1.26 | 7.15 | 10.1  | 9.19 | 9.01 | 1.55 | 0.47   |
| 31                              | 19.4 | 16.8 | 19.1                    | 4.30 | 1.27 | 7.90 | 9.62  | 8.86 | 8.59 | 1.47 | 0.42   |
| 50                              | 21.5 | 5.8  | 18.6                    | 4.09 | 1.19 | 7.05 | 8.60  | 8.22 | 8.48 | 1.45 | 0.14   |
| 65                              |      | 2.6  | 14.4                    | 3.10 | 0.94 | 5.60 | 6.98  | 7.03 | 7.23 | 1.29 |        |
| 70                              | 19.0 | 2.8  | 14.7                    | 3.09 |      | 6.40 | 6.77  | 6.85 | 7.02 | 1.26 | 0.08   |
| 76                              | 16.0 | 1.6  | 12.2                    | 2.56 | 0.77 | 4.83 | 6.27  | 6.37 | 6.77 | 1.25 | 0.05   |
| 81                              | 15.5 | 2.1  | 11.5                    | 2.41 |      | 4.53 | 5.71  | 6.30 | 6.81 | 1.20 | 0.07   |
| 86                              | 15.6 | 3.1  | 11.9                    | 2.46 | 0.74 | 4.72 | 6.05  | 6.29 | 6.66 | 1.23 | 0.10   |
| 91                              | 17.2 | 9.7  | 12.9                    | 2.68 |      | 4.84 | 6.00  | 6.45 | 6.86 | 1.23 | 0.30   |
| 96                              | 18.9 | 13.7 | 14.3                    | 2.97 | 0.88 | 5.16 | 6.76  | 6.88 | 7.21 | 1.28 | 0.38   |
| 100                             | 20.1 | 16.5 | 15.2                    | 3.13 | 0.77 | 5.46 | 6.71  | 7.39 | 7.40 | 1.30 | 0.43   |
| 105                             | 20.5 | 18.8 | 15.5                    | 3.23 | 0.97 |      | 7.02  | 7.09 | 7.35 | 1.40 | 0.48   |
| 110                             | 24.1 | 27.5 | 18.4                    | 3.83 | 0.93 |      | 7.86  | 7.86 | 7.46 | 1.41 | 0.60   |
| 115                             | 25.2 | 31.1 | 19.3                    | 3.98 | 1.15 | 6.39 | 8.23  | 7.93 | 8.16 | 1.39 | 0.65   |

| Depth   | La   | Ce   | CONC = pmol/kg |      |      |      | Gd   | Dy   | Er   | Yb   | Lu | Ce/Ce* |
|---|------|------|----------------|------|------|------|------|------|------|------|----|--------|
|   |      |      | Nd             | Sm   | Eu   |      |      |      |      |      |    |        |
| -----   | -    | -    | -              | -    | -    | -    | -    | -    | -    | -    |    | -      |
| 120   | 35.0 | 55.1 | 27.1           | 5.56 | 1.60 | 8.39 | 10.7 | 9.57 | 9.51 | 1.62 |    | 0.82   |
| 125   | 39.3 | 63.1 | 29.9           | 6.13 | 1.43 | 9.08 | 11.2 | 10.3 | 10.0 | 1.74 |    | 0.84   |
| 130   | 37.0 | 57.4 | 29.2           | 6.02 | 1.72 | 8.85 | 11.0 | 10.0 | 10.0 | 1.69 |    | 0.80   |
| 150   | 59.6 | 106  | 47.8           | 9.75 | 2.26 | 13.0 | 15.2 | 12.9 | 11.7 | 2.03 |    | 0.92   |
| 180   | 76.0 | 145  | 59.3           | 11.9 | 3.32 | 16.1 | 19.3 | 14.8 | 13.9 | 2.26 |    | 0.99   |
| 500   | 96.1 | 181  | 76.6           | 15.4 |      | 20.3 | 21.1 | 16.1 | 14.3 | 2.33 |    | 0.97   |
| 800   | 83.0 | 142  | 64.1           | 13.0 | 3.54 | 17.6 | 16.0 |      | 12.7 | 2.03 |    | 0.89   |
| 1500  | 64.7 | 105  | 50.5           | 10.4 |      | 13.4 | 15.4 | 11.5 | 10.5 | 1.73 |    | 0.84   |
| 2153  | 62.1 | 96.3 | 48.1           | 9.88 | 2.74 | 12.2 | 14.6 | 11.3 | 10.1 | 1.66 |    | 0.81   |
| 2174  | 58.3 | 89.6 | 45.3           | 9.01 | 2.42 | 12.8 | 14.1 | 10.8 | 9.65 | 1.59 |    | 0.80   |
| 2185  | 62.8 | 52.9 | 47.6           | 9.67 | 2.74 | 11.8 | 14.5 | 11.2 | 9.30 | 1.72 |    | 0.44   |
|   |      |      |                |      |      |      |      |      |      |      |    |        |
|   |      |      |                |      |      |      |      |      |      |      |    |        |
| Schijf and De Baar (1995) Data from Bosporus 0.22 um filtration |      |      |                |      |      |      |      |      |      |      |    |        |
| Sta. HKS  |      |      |                |      |      |      |      |      |      |      |    |        |
|   |      |      |                |      |      |      |      |      |      |      |    |        |
| 8   |      | 31.7 | 24.4           | 5.61 | 1.66 |      |      |      | 10.2 | 1.57 |    |        |
| 30  |      | 16.9 | 23.5           | 5.47 | 1.56 |      |      | 10.6 | 9.37 |      |    |        |
| 65  |      | 13.8 | 20.2           | 4.40 | 1.31 |      |      |      | 8.13 | 1.2  |    |        |

|   |      |      |                |      |      |         |      |      |      |      |        |
|---|------|------|----------------|------|------|---------|------|------|------|------|--------|
|   |      |      |                |      |      |         |      |      |      |      |        |
| Anoxic Basins                             |      |      |                |      |      |         |      |      |      |      |        |
| saanich.xls                               |      |      |                |      |      |         |      |      |      |      |        |
| Saanich Inlet                             |      |      | CONC = pmol/kg |      |      |         |      |      |      |      |        |
| Depth                                     | La   | Ce   | Nd             | Sm   | Eu   | Gd      | Dy   | Er   | Yb   | Lu   | Ce/Ce* |
| -----                                     | -    | -    | -              | -    | -    | -       | -    | -    | -    |      | -      |
| German & Elderfield (1989)                |      |      |                |      |      |         |      |      |      |      |        |
| CSS Vector (48 36.6' N & 123 30.0' W)     |      |      |                |      |      | Map #26 |      |      |      |      |        |
|   |      |      |                |      |      |         |      |      |      |      |        |
| A. Dissolved Samples [0.4 um filtered]    |      |      |                |      |      |         |      |      |      |      |        |
| 0   | 44.5 | 73.3 | 28.4           | 5.59 | 1.60 | 7.38    | 8.06 | 6.52 | 6.01 | 0.97 | 0.91   |
| 10  |      | 20.8 | 29.1           | 5.61 |      |         | 7.60 | 6.61 |      | 1.05 |        |
| 20  |      | 19.7 | 24.8           | 4.94 |      |         |      |      |      |      |        |
| 50  |      |      | 20.6           | 4.04 | 1.18 |         | 6.10 | 5.37 |      | 1.11 |        |
| 75  |      | 8.1  | 17.0           |      |      |         |      |      |      |      |        |
| 100                                       | 31.4 | 6.8  | 16.1           | 2.95 | 0.86 |         | 4.33 | 3.87 | 3.90 |      | 0.12   |
| 125                                       | 39.4 | 6.4  | 13.2           | 2.25 |      |         |      |      |      |      | 0.10   |
| 140                                       |      |      | 14.3           | 2.48 | 0.69 | 4.55    | 3.71 | 3.34 | 3.48 | 0.73 |        |
| 150                                       |      | 7.4  | 13.1           | 2.36 | 0.71 |         | 3.58 | 3.41 | 3.73 |      |        |
| 155                                       | 33.1 | 8.0  | 13.4           | 2.43 | 0.70 |         | 4.21 | 3.38 |      | 0.57 | 0.15   |
| 160                                       |      |      | 19.2           | 3.53 | 0.87 | 5.62    | 4.66 | 3.87 |      | 0.67 |        |
| 165                                       | 58.2 | 38.4 | 23.3           | 4.29 | 1.18 | 6.08    | 5.24 | 3.98 | 4.71 | 0.65 | 0.40   |
| 170                                       |      |      | 26.2           | 4.94 | 1.36 |         | 5.75 | 4.27 |      | 0.82 |        |
| 175                                       |      |      | 26.9           | 4.95 | 1.38 | 6.69    | 5.78 | 4.31 |      | 0.75 |        |
| 180                                       |      |      | 27.8           | 5.22 | 1.37 | 6.81    | 6.77 | 4.65 |      | 0.72 |        |
| 190                                       |      |      | 29.2           | 5.38 | 1.49 | 7.55    | 6.12 | 4.51 | 5.57 |      |        |
| 200                                       |      |      | 29.9           | 5.53 | 1.50 |         | 5.94 | 4.54 |      |      |        |
| 205                                       | 53.3 | 58.2 | 31.7           | 5.87 | 1.58 |         | 6.81 | 4.79 | 4.31 | 0.70 | 0.61   |
| 210                                       |      | 60.2 | 31.8           | 5.90 |      | 7.48    | 7.41 | 5.63 |      | 0.91 |        |
| 215                                       | 54.9 | 60.9 | 33.0           | 6.16 | 1.70 | 7.47    | 6.82 | 4.80 | 4.32 | 0.71 | 0.62   |
|   |      |      |                |      |      |         |      |      |      |      |        |
| B. Suspended Particles [pmol/kg of water] |      |      |                |      |      |         |      |      |      |      |        |
|   |      |      |                |      |      |         |      |      |      |      |        |
| 0   | 6.8  | 10.9 | 5.2            | 1.1  | 0.3  | 1.1     | 0.9  | 0.4  | 0.3  | 0.07 |        |
| 20  |      | 19.8 | 9.3            | 2.0  |      | 1.9     | 1.5  | 0.7  | 0.5  | 0.07 |        |
| 50  | 24.4 | 18.7 | 10.2           | 2.2  | 0.6  | 2.0     | 1.8  | 0.9  | 0.7  | 0.10 |        |
| 75  |      | 61.8 | 31.5           | 6.9  | 1.7  | 6.6     | 5.3  | 2.7  | 2.1  | 0.29 |        |
| 100                                       | 39.0 | 86.0 | 45.6           | 9.9  | 2.5  | 9.3     | 7.6  | 3.8  | 3.0  | 0.41 |        |
| 125                                       |      | 60.2 | 32.2           | 6.8  | 1.7  | 5.8     | 5.7  | 2.9  | 2.3  | 0.33 |        |
| 140                                       | 30.2 | 51.0 | 27.4           | 5.9  | 1.5  | 6.0     | 5.1  | 2.7  | 2.1  |      |        |
| 150                                       | 31.0 | 62.9 | 31.6           | 6.7  | 1.7  | 6.4     | 5.3  | 2.7  | 2.1  | 0.29 |        |
| 160                                       | 23.9 | 44.9 | 22.9           | 4.6  |      |         | 4.3  | 2.0  | 1.8  |      |        |
| 165                                       |      | 21.7 | 12.7           | 2.8  | 0.7  | 2.8     | 2.2  | 1.1  | 0.9  |      |        |
| 180                                       |      | 7.9  | 4.3            | 0.9  | 0.2  |         | 0.9  |      | 0.7  | 0.05 |        |
| 205                                       | 4.9  | 9.2  | 4.4            | 0.9  | 0.2  | 0.9     | 0.7  | 0.3  | 0.3  | 0.04 |        |

## CARIACO.XLS

|                                    |      |      |                         |      |      |          |      |      |      |      |        |
|------------------------------------|------|------|-------------------------|------|------|----------|------|------|------|------|--------|
|                                    |      |      |                         |      |      |          |      |      |      |      |        |
| Anoxic Basins                      |      |      |                         |      |      |          |      |      |      |      |        |
| cariaco.xls                        |      |      |                         |      |      |          |      |      |      |      |        |
| Cariaco Trench (10 40'N & 65 35'W) |      |      |                         |      |      | Map # 27 |      |      |      |      |        |
| DeBarr et. al. (1988)              |      |      | 1.0 um filtered samples |      |      |          |      |      |      |      |        |
| Depth                              | La   | Ce   | Nd                      | Sm   | Eu   | Gd       | Dy   | Er   | Yb   | Lu   | Ce/Ce* |
|                                    | -    | -    | -                       | -    | -    | -        | -    | -    | -    | -    | -      |
| 5                                  | 19.4 | 17.8 | 19.6                    | 4.78 | 1.41 | 5.60     | 6.85 | 5.44 | 4.31 | 0.62 | 0.44   |
| 50                                 | 15.5 | 12.1 | 14.8                    | 3.27 | 0.88 | 4.15     | 5.36 | 4.05 | 3.51 |      | 0.38   |
| 119                                |      | 10.3 | 13.6                    | 3.06 | 0.79 |          | 4.96 | 4.01 | 4.13 |      |        |
| 150                                | 15.7 | 9.5  | 14.0                    | 3.02 | 0.79 | 3.80     | 4.59 |      |      |      | 0.30   |
| 256                                | 11.7 | 4.0  | 9.5                     | 1.78 | 0.49 | 2.77     | 3.44 | 2.80 | 2.53 | 0.43 | 0.18   |
| 278                                | 11.6 | 4.4  | 8.4                     | 1.68 | 0.46 | 2.45     | 3.15 | 2.63 | 2.48 | 0.40 | 0.20   |
| 288                                | 12.8 | 20.7 | 10.2                    | 2.05 | 0.56 | 3.05     | 3.18 |      | 2.54 | 0.41 | 0.84   |
| 292                                | 15.3 | 30.4 | 11.6                    | 2.41 | 0.63 | 3.14     | 3.64 | 2.93 |      | 0.44 | 1.04   |
| 302                                | 15.1 | 29.9 | 11.6                    | 2.39 | 0.63 | 3.09     | 3.50 | 2.94 | 2.65 | 0.40 | 1.03   |
| 322                                | 16.3 | 36.5 | 12.8                    | 2.62 | 0.70 |          | 3.83 | 3.09 | 2.72 |      | 1.16   |
| 327                                | 16.3 | 33.3 | 11.7                    | 2.48 | 0.66 | 3.18     | 3.84 | 2.97 |      |      | 1.09   |
| 337                                | 16.9 | 35.5 | 13.5                    | 2.86 | 0.64 | 3.34     |      |      |      |      | 1.08   |
| 357                                | 19.5 | 41.3 | 14.4                    | 2.91 | 0.77 |          |      | 3.28 | 2.82 |      | 1.12   |
| 377                                | 21.4 | 45.8 | 16.0                    | 3.11 | 0.82 |          | 4.34 | 3.32 | 3.09 |      | 1.13   |
| 496                                | 21.3 | 53.7 | 20.4                    | 3.98 | 0.97 | 5.22     | 4.83 | 3.74 | 3.67 | 0.66 | 1.23   |
| 594                                |      | 55.1 | 20.1                    | 4.19 |      | 5.42     | 5.40 | 3.74 |      |      |        |
| 697                                | 23.7 | 57.7 | 21.2                    | 4.44 | 1.17 | 5.79     | 6.12 | 4.61 |      |      | 1.21   |
| 994                                | 23.2 | 48.8 | 18.9                    | 3.98 | 1.04 |          | 5.24 | 3.49 | 2.94 | 0.45 | 1.08   |
| 1097                               |      | 55.4 | 21.1                    | 4.67 | 1.17 | 6.71     | 6.75 | 3.92 | 3.17 | 0.50 |        |
| 1319                               | 23.3 | 51.0 | 19.7                    | 4.16 | 1.07 | 5.66     | 5.17 | 3.63 | 3.19 |      | 1.11   |

**Table A13: Handbook section 7.2. Marine Pore Waters**

File name: PW\_REE.XLS. Concentration of RE in pore waters

|   |      |      |      |      |      |      |      |      |      |      |    |       |
|---|------|------|------|------|------|------|------|------|------|------|----|-------|
| pw_REE.xls  |      |      |      |      |      |      |      |      |      |      |    |       |
| Pore Water Concentrations                               |      |      |      |      |      |      |      |      |      |      |    |       |
| Sholkovitz et al. (1989), Buzzards Bay, MA, USA         |      |      |      |      |      |      |      |      |      |      |    |       |
| pmol/kg   |      |      |      |      |      |      |      |      |      |      |    |       |
| Sample  | La   | Ce   | Nd   | Sm   | Eu   | Gd   | Dy   | Er   | Yb   | Lu   | Ce | Anom. |
| 1 m Water Column  | 49.3 | 95.3 | 75.3 | 7.35 | 1.72 | 8.02 |      |      |      |      |    | 0.78  |
| 5 m Water Column  | 48.6 | 81.5 | 45.2 | 7.73 | 1.71 | 10   | 11.2 | 8.85 | 8.69 | 1.42 |    | 0.82  |
| 14 m Water Column                                       | 74   | 106  | 76.9 | 11.7 | 2.58 | 14.5 | 14.8 | 11   | 10.5 | 1.71 |    | 0.68  |
| Overlying Water   | 61.8 | 145  | 38.3 | 6.5  | 1.4  | 8.76 | 10.5 | 8.72 |      | 1.43 |    | 1.3   |
| Pore Water* Depth (cm)                                  |      |      |      |      |      |      |      |      |      |      |    |       |
| 0-3   | 117  | 428  | 93.1 | 19   | 3.87 | 20   |      |      |      |      |    | 1.89  |
| 3-6   | 269  | 693  | 266  | 51.9 | 9.6  | 49.1 | 46.4 | 27.3 | 25.1 |      |    | 1.24  |
| 6-9   | 379  | 1248 | 306  | 55.8 | 14.5 | 51.4 | 47.4 | 27.7 | 27.3 |      |    | 1.7   |
| 9-12  | 631  | 1531 | 595  | 115  | 21   | 104  |      |      |      |      |    | 1.19  |
| 12-15   | 842  | 2070 | 788  | 152  | 27.7 | 140  |      |      |      |      |    | 1.21  |
| 18-21   | 950  | 2359 | 892  | 175  | 32.8 | 150  | 132  | 73.4 | 67.9 | 10.5 |    | 1.22  |
| 24-27   | 1095 | 2673 | 1041 | 204  | 37.7 | 190  | 155  | 85.4 | 77.8 | 12.3 |    | 1.19  |
| 30-33   | 1059 | 2448 | 1031 | 201  | 31.2 | 192  | 159  | 87   | 80   | 12.6 |    | 1.12  |
| 33-36   | 927  | 2263 | 895  | 176  | 32.9 | 159  |      | 80   |      | 12   |    | 1.18  |
| 36-39   | 1764 | 4104 | 1733 | 344  | 63.1 | 311  |      |      |      |      |    | 1.12  |
| 39-42   | 1216 | 2915 | 1214 | 245  | 45.5 | 229  | 194  | 109  | 104  | 16.2 |    | 1.14  |
| 42-45   | 1300 | 3308 | 1245 | 251  | 47.3 | 229  | 201  | 116  | 113  | 18   |    | 1.24  |
| 45-48   | 913  | 2271 | 888  | 178  | 33.7 | 169  | 151  | 91.4 | 91   | 14.9 |    | 1.21  |
| 51-54   | 1057 | 2508 | 1040 | 210  | 39.2 | 198  | 172  | 102  | 103  | 16.7 |    | 1.14  |
| 60-66   | 896  | 2361 | 830  | 167  | 32.4 | 160  | 152  | 97.1 | 103  | 17.5 |    | 1.29  |
| 66-72   | 551  | 1768 | 512  | 102  | 19.8 | 102  | 104  | 75.4 | 85.3 |      |    | 1.58  |
| * 0.45 um filtered                                      |      |      |      |      |      |      |      |      |      |      |    |       |
| Elderfield and Sholkovitz (1987), Buzzards Bay, MA, USA |      |      |      |      |      |      |      |      |      |      |    |       |
|   | La   | Ce   | Nd   | Sm   | Eu   | Gd   | Dy   | Er   | Yb   | Lu   |    |       |
| Overlying seawater 1                                    |      | 91.9 | 27.2 | 4.7  | 1.04 |      | 6.83 | 5.71 | 6.26 | 1.07 |    |       |
| Overlying seawater 2                                    | 42.5 | 106  | 27.2 | 4.13 | 0.92 |      | 7.39 | 5.56 | 6.04 |      |    |       |
| Pore water* depth (cm)                                  |      |      |      |      |      |      |      |      |      |      |    |       |
| 0-1**   | 51.8 | 130  | 65.2 | 15   | 3.38 | 19.5 | 26.9 | 19.7 | 22.7 | 3.7  |    |       |
| 0-1**   |      | 320  | 62.9 | 14.8 | 3.2  | 20.3 | 25.1 | 21.2 | 23.7 | 4.0  |    |       |
| 1-3   |      | 757  | 245  | 40   | 8.46 |      | 41.9 | 29.3 | 32.3 | 5.17 |    |       |
| 3-5   | 106  | 227  | 107  | 23.4 | 4.97 | 26.5 | 29.2 | 21.9 | 23.2 | 3.97 |    |       |
| 5-7   | 44.6 | 98.6 | 49   | 11   | 2.02 |      | 16.2 | 13.7 | 15.7 | 2.67 |    |       |
| 7-9   | 151  | 264  | 121  | 24.7 | 5.06 |      | 26.3 | 18   | 18.8 | 3.07 |    |       |
| 9-11  | 137  | 268  | 114  | 23.4 | 4.84 | 27.1 | 25.3 | 17.8 | 18.6 |      |    |       |
| 11-13   |      | 608  | 274  | 52.5 | 10.4 |      |      |      | 28.6 |      |    |       |
| 13-15   |      | 912  | 356  | 69.8 | 13.6 | 59.8 | 61.4 | 35.9 | 34.2 | 5.49 |    |       |
| 17-19   | 444  | 898  | 358  |      | 13.2 | 66.2 | 62.2 | 36.1 | 32.1 | 5.5  |    |       |
| 23-25   |      | 1162 | 486  | 98.1 | 19.7 | 87.3 | 83.4 | 48.8 | 48.5 | 7.77 |    |       |
| 27-29   |      | 1910 | 815  | 164  | 30.8 |      | 127  | 73   | 68.6 | 10.8 |    |       |
| ** replicates, * 0.45 um filtered                       |      |      |      |      |      |      |      |      |      |      |    |       |

|  |  |      |      |      |      |      |      |      |      |      |      |       |
|--|--|------|------|------|------|------|------|------|------|------|------|-------|
|  |  |      |      |      |      |      |      |      |      |      |      |       |
| German and Elderfield (1989) Saanich Inlet |  |      |      |      |      |      |      |      |      |      |      |       |
|  |  | La   | Ce   | Nd   | Sm   | Eu   | Gd   | Dy   | Er   | Yb   | Lu   | Ce-   |
| Overlying seawater                         |  | 55   | 61   | 33   | 6.2  | 1.7  |      | 6.8  | 4.8  |      |      | Anom. |
|  |  |      |      |      |      |      |      |      |      |      |      |       |
| Pore water* depth (cm)                     |  |      |      |      |      |      |      |      |      |      |      |       |
| 0-3  |  | 1217 | 649  | 344  | 84.9 |      |      |      |      |      |      |       |
| 3-6  |  | 479  | 193  | 127  | 40.3 | 12.3 |      | 96.9 | 82.3 |      |      |       |
| 6-9  |  |      | 244  | 171  | 46.2 |      |      | 135  | 163  |      |      |       |
| 9-12                                       |  | 533  | 168  | 113  | 35.7 |      |      | 119  |      |      |      |       |
| 12-15                                      |  | 49   | 48   | 31   | 8.6  | 3.25 |      |      | 68.1 |      |      |       |
| 15-18                                      |  | 28   | 18   | 13   | 3.4  | 1.25 |      |      | 11.7 |      |      |       |
| * 0.4 um filtered                          |  |      |      |      |      |      |      |      |      |      |      |       |
|  |  |      |      |      |      |      |      |      |      |      |      |       |
| Sholkovitz et al. (1992)                   |  |      |      |      |      |      |      |      |      |      |      |       |
| Chesapeake Bay 0-1 cm Pore Water*          |  |      |      |      |      |      |      |      |      |      |      |       |
| Time-Series                                |  |      |      |      |      |      |      |      |      |      |      |       |
|  |  |      |      |      |      |      |      |      |      |      |      |       |
|  |  |      |      |      |      |      |      |      |      |      |      |       |
| Date                                       |  |      |      |      |      |      |      |      |      |      |      |       |
| 10-Feb-88                                  |  |      |      |      |      |      |      |      |      |      |      |       |
| 12-Apr-88                                  |  | 122  | 256  | 214  | 56.2 | 14.7 | 152  | 72.7 | 55.9 | 56   | 8.28 | 0.79  |
| 17-May-88                                  |  | 226  | 490  | 328  | 83.6 | 20.6 | 158  |      |      |      |      | 0.89  |
| 14-Jun-88                                  |  | 458  | 1032 | 599  | 148  | 34.5 | 434  |      |      |      |      | 0.97  |
| 6-Jul-88                                   |  | 815  | 1727 | 1154 | 293  | 69.2 | 350  | 288  | 173  | 145  | 18.5 | 0.88  |
| 26-Jul-88                                  |  | 962  | 3728 | 1221 | 294  | 68.9 | 339  | 299  | 177  | 148  | 19.4 | 1.69  |
| 16-Aug-88                                  |  | 1040 | 2382 | 1188 | 262  | 59.8 | 290  |      |      |      |      | 1.04  |
| 21-Sep-88                                  |  | 230  | 395  | 295  | 88   | 18.7 | 117  | 121  | 78.5 | 69.4 |      | 0.75  |
| 24-Oct-88                                  |  | 227  | 447  | 274  | 68   | 16.9 | 89.5 | 89.2 | 67.3 | 64.5 | 9.17 | 0.88  |
| 15-Nov-88                                  |  |      |      |      |      |      |      |      |      |      |      |       |
| 20-Dec-88                                  |  | 152  | 333  | 223  | 55.2 | 13.9 | 76.5 | 73.1 | 56.2 | 53.9 | 7.73 | 0.90  |
| 15-Feb-89                                  |  | 147  | 284  | 164  | 39   | 10.0 | 54   | 47   | 37   | 36   | 5.10 | 0.89  |
| *0.22 um filtered                          |  |      |      |      |      |      |      |      |      |      |      |       |
|  |  |      |      |      |      |      |      |      |      |      |      |       |
| Ridout and Pagett (1984)                   |  |      |      |      |      |      |      |      |      |      |      |       |
| Great Meteor East, North Atlantic Ocean    |  |      |      |      |      |      |      |      |      |      |      |       |
|  |  |      |      |      |      |      |      |      |      |      |      |       |
| Pore water*, dept                          |  |      |      |      |      |      |      |      |      |      |      |       |
|  |  | 16.4 | 28.1 | 22.3 | 4.35 | 1.53 |      | 5.66 | 3.63 | 6.25 |      |       |
| *0.45 um filtered                          |  |      |      |      |      |      |      |      |      |      |      |       |
|  |  | La   | Ce   | Nd   | Sm   | Eu   | Gd   | Dy   | Er   | Yb   | Lu   | Ce-   |
|  |  |      |      |      |      |      |      |      |      |      |      | Anom. |

**Table A14: Handbook section 7.3. Marine hydrothermal vent waters**

File name: VENTS.XLS. Concentration of RE in the hydrothermal waters of the Atlantic and Pacific Oceans.

| VENTS.XLS  |       | Hydrothermal Waters |       |      |      |     |      |     |    |     |    |     |
|--|-------|---------------------|-------|------|------|-----|------|-----|----|-----|----|-----|
| Klinkhammer et. al. (1994a)                          |       |                     |       |      |      |     |      |     |    |     |    |     |
| ID   |       | La                  | Ce    | Pr   | Nd   | Sm  | Eu   | Gd  | Tb | Dy  | Ho | Er  |
| 982  | ICPMS | 1280                | 2100  | 320  | 1440 | 280 | 3400 | 220 | 31 | 120 | 21 | 46  |
| 982  | TIMS  | 1353                | 2161  |      | 1459 | 280 | 3352 | 244 |    | 122 |    | 47  |
| 1636-3   | ICPMS | 1200                | 2400  | 360  | 1720 | 330 | 2400 | 260 | 34 | 140 | 22 | 61  |
| 1636-3   | TIMS  | 1218                | 2439  |      | 1632 | 329 | 1915 | 251 |    | 142 |    | 52  |
| 1637-3   | ICPMS | 800                 | 1250  | 150  | 550  | 92  | 1070 | 105 | 15 | 68  | 16 | 30  |
| 1637-3   | TIMS  | 754                 | 1187  |      | 506  | 92  | 1047 | 96  |    | 67  |    | 29  |
| 1150-11  | ICPMS | 730                 | 590   | 54   | 164  | 16  | 280  | 16  | 3  | 14  | 2  | 5   |
| 1150-11  | TIMS  | 663                 | 551   |      | 165  | 18  | 259  | 17  |    | 12  |    | 8   |
| 1683-14  | ICPMS | 2700                | 6800  | 980  | 2800 | 390 | 2600 | 450 | 70 | 240 | 35 | 60  |
| 1683-14  | TIMS  | 2549                | 6606  |      | 2635 | 413 | 2391 | 418 |    | 239 |    | 64  |
| 1160-6   | ICPMS | 2100                | 3800  | 480  | 2100 | 470 | 1970 | 444 | 65 | 300 | 54 | 110 |
| 1160-6   | TIMS  | 2196                | 3718  |      | 2108 | 439 | 1878 | 425 |    | 300 |    | 94  |
| 1635-3   | ICPMS | 1500                | 1000  | 98   | 340  | 40  | 380  | 42  | 6  | 32  | 5  | 13  |
| 1635-3   | TIMS  | 1472                | 904   |      | 322  | 41  | 353  | 44  |    | 33  |    | 16  |
| 1158-16  | ICPMS | 1080                | 1600  | 167  | 588  | 100 | 1220 | 120 | 18 | 88  | 18 | 45  |
| 1158-16  | TIMS  | 964                 | 1483  |      | 592  | 85  | 1163 | 125 |    | 76  |    | 34  |
| 1160-16  | ICPMS | 2170                | 4330  | 550  | 1690 | 360 | 1870 | 370 | 50 | 270 | 40 | 90  |
| 1160-16  | TIMS  | 2191                | 4188  |      | 2066 | 400 | 1802 | 397 |    | 265 |    | 87  |
| 1683-5   | ICPMS | 1610                | 3660  | 510  | 2300 | 480 | 2050 | 360 | 57 | 240 | 32 | 65  |
| 1683-5   | TIMS  | 1689                | 3560  |      | 1888 | 405 | 2026 | 348 |    | 221 |    | 63  |
| 1152-7   | ICPMS | 1500                | 1610  | 190  | 680  | 132 | 1240 | 100 | 9  | 40  | 6  | 15  |
| 1152-7   | TIMS  | 1163                | 1683  |      | 637  | 96  | 1128 | 155 |    | 85  |    | 41  |
| 1155-18  | ICPMS | 6900                | 14200 | 1420 | 4900 | 430 | 4500 | 450 | 61 | 220 | 32 | 88  |
| 1155-18  | TIMS  | 6528                | 13640 |      | 4715 | 416 | 4404 | 459 |    | 213 |    | 74  |
| 1620-1   | ICPMS | 1440                | 1560  | 140  | 387  | 52  | 1500 | 30  | 5  | 17  | 4  | 11  |
| 1620-1   | TIMS  | 1415                | 1468  |      | 345  | 49  | 1451 | 33  |    | 11  |    | 5   |
| Comparison of two analytical methods:                |       |                     |       |      |      |     |      |     |    |     |    |     |
| ICPMS = inductively coupled plasma mass spectrometry |       |                     |       |      |      |     |      |     |    |     |    |     |
| TIMS = thermal ionization mass spectrometry          |       |                     |       |      |      |     |      |     |    |     |    |     |
|  |       |                     |       |      |      |     |      |     |    |     |    |     |
|  |       |                     |       |      |      |     |      |     |    |     |    |     |
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| Klinkhammer et. al (1994b)                      |       |       |       | Conc = pmol / Kg |       |       |             |       |       |       |     |
|---|-------|-------|-------|------------------|-------|-------|-------------|-------|-------|-------|-----|
| ID  | La    | Ce    | Pr    | Nd               | Sm    | Eu    | Gd          | Tb    | Dy    | Ho    | Er  |
| HG 1981   | 2100  | 3980  | 510   | 1980             | 450   | 1980  | 440         | 56    | 310   | 49    | 108 |
| HG 1985   | 1656  | 2500  | 332   | 1440             | 340   | 1390  | 320         | 46    | 250   | 38    | 81  |
| NGS 1981  | 2300  | 4490  | 650   | 2500             | 440   | 4600  | 360         | 45    | 200   | 34    | 78  |
| OBS 1981  | 1080  | 1540  | 166   | 610              | 113   | 1250  | 126         | 18    | 94    | 18    | 46  |
| OBS 1985  | 1310  | 1760  | 210   | 730              | 170   | 1190  | 140         | 20    | 94    | 16    | 40  |
| SW 1981   | 750   | 600   | 56    | 169              | 16    | 270   | 17          | 3     | 14    | 2     | 5   |
| SW 1985   | 1620  | 1270  | 123   | 414              | 46    | 416   | 48          | 8     | 33    | 7     | 17  |
| 13 N #1   | 3870  | 7800  | 1290  | 6120             | 1450  | 5650  | 1280        | 168   | 780   | 117   | 250 |
| 13 N #2   | 4510  | 11700 | 1760  | 7660             | 1700  | 4000  | 1120        | 168   | 750   | 121   | 340 |
| 13 N #3   | 10800 | 15800 | 1590  | 5730             | 1040  | 1990  | 920         | 120   | 700   | 116   | 290 |
| 11 N #4   | 6600  | 13100 | 1920  | 8550             | 1680  | 7300  | 1270        | 150   | 770   | 88    | 200 |
| 11 N #5   | 2600  | 4880  | 610   | 2500             | 500   | 3950  | 280         | 48    | 300   | 58    | 127 |
| 11 N #6   | 2870  | 3630  | 500   | 2240             | 580   | 1471  | 470         | 65    | 350   | 57    | 145 |
| MARK I  | 2822  | 7110  | 1030  | 2930             | 410   | 2720  | 470         | 73    | 250   | 36    | 63  |
| MARK II   | 1680  | 3820  | 530   | 2400             | 500   | 2140  | 375         | 59    | 250   | 33    | 68  |
| E. HILL 1982                                    | 880   | 745   | 82    | 225              | 29    | 266   | 17          | 3     | 15    | 3     | 5   |
| E. HILL 1985                                    | 670   | 620   | 63    | 216              | 31    | 228   | 24          | 4     | 15    | 3     | 5   |
| S. FIELD 1985                                   | 1470  | 1590  | 143   | 390              | 53    | 1530  | 30          | 5     | 17    | 4     | 11  |
| Marianas  | 1950  | 2140  | 200   | 770              | 155   | 2900  | 125         | 16    | 77    | 14    | 31  |
| Escanaba  | 870   | 1020  | 122   | 490              | 112   | 165   | 93          | 13    | 80    | 26    | 36  |
| Endeavor  | 3105  | 4221  | 397   | 1296             | 216   | 678   | 199         | 29    | 158   | 27    | 60  |
| AVE. FLUID                                      | 2643  | 4491  | 585   | 2350             | 478   | 2194  | 387         | 53    | 262   | 41    | 96  |
|   |       |       |       |                  |       |       |             |       |       |       |     |
|   |       |       |       |                  |       |       |             |       |       |       |     |
|   |       |       |       |                  |       |       |             |       |       |       |     |
| German et. al. (1990): TAG Field in N. Atlantic |       |       |       |                  |       |       | (pmol / Kg) |       |       |       |     |
| ID  | La    | Ce    | Pr    | Nd               | Sm    | Eu    | Gd          | Tb    | Ho    | Er    |     |
| TAG:14  | 1.90  | 1.83  | 0.465 | 1.87             | 0.474 | 0.111 | 0.383       | 0.065 | 0.072 | 0.194 |     |
| TAG:18  | 2.68  | 2.02  | 0.683 | 2.81             | 0.668 | 0.168 | 0.559       | 0.101 | 0.113 | 0.301 |     |
| TAG:19  | 2.13  | 1.69  | 0.528 | 2.16             | 0.509 | 0.130 | 0.446       | 0.077 | 0.087 | 0.226 |     |
| TAG:22  | 3.96  | 2.26  | 1.009 | 4.09             | 0.893 | 0.265 | 0.753       | 0.150 | 0.179 | 0.469 |     |
| TAG:32T   | 4.14  | 2.48  | 1.039 | 4.20             | 1.001 | 0.265 | 0.813       | 0.149 | 0.165 | 0.434 |     |
| TAG:32B   | 1.99  | 1.97  | 0.522 | 2.02             | 0.456 | 0.119 | 0.387       | 0.069 | 0.074 | 0.184 |     |
| TAG:35T   | 3.73  | 2.14  | 0.942 | 3.78             | 0.872 | 0.237 | 0.775       | 0.138 | 0.155 | 0.413 |     |
| TAG:35B   | 1.69  | 1.78  | 0.437 | 1.71             | 0.377 | 0.090 | 0.315       | 0.060 | 0.067 | 0.174 |     |
| TAG:39T   | 3.70  | 2.06  | 0.944 | 3.85             | 0.847 | 0.229 | 0.756       | 0.143 | 0.165 | 0.441 |     |
| TAG:39B   | 1.49  | 1.68  | 0.390 | 1.62             | 0.364 | 0.092 | 0.308       | 0.055 | 0.062 | 0.160 |     |
| TAG:43T   | 3.24  | 2.15  | 0.823 | 3.35             | 0.754 | 0.213 | 0.613       | 0.121 | 0.138 | 0.365 |     |
| TAG:43B   | 0.98  | 1.61  | 0.253 | 1.02             | 0.224 | 0.057 | 0.194       | 0.035 | 0.035 | 0.093 |     |
| TAG:48T   | 0.70  | 1.59  | 0.157 | 0.62             | 0.127 | 0.032 | 0.112       | 0.017 | 0.018 | 0.044 |     |
| TAG:48B   | 0.65  | 1.46  | 0.148 | 0.59             | 0.122 | 0.026 | 0.111       | 0.017 | 0.017 | 0.046 |     |
| TAG:53T   | 0.72  | 1.45  | 0.160 | 0.63             | 0.144 | 0.032 | 0.133       | 0.019 | 0.020 | 0.056 |     |
| TAG:53B   | 3.55  | 2.34  | 0.932 | 3.98             | 0.884 | 0.263 | 0.733       | 0.145 | 0.170 | 0.445 |     |
| Vent fluid                                      | 2700  | 5800  | 750   | 2700             | 470   | 2600  | 390         | 69    | 34    | 70    |     |
| Sea water                                       | 29.35 | 7.26  | 4.87  | 20.66            | 4.13  | 1.047 | 5.12        | 0.795 | 1.554 | 4.97  |     |
|   |       |       |       |                  |       |       |             |       |       |       |     |
|   |       |       |       |                  |       |       |             |       |       |       |     |
|   |       |       |       |                  |       |       |             |       |       |       |     |
|   |       |       |       |                  |       |       |             |       |       |       |     |

|   |        |      |      |      |                   |     |     |     |
|---|--------|------|------|------|-------------------|-----|-----|-----|
|   | Ce     | Nd   | Sm   | Eu   | Gd                | Dy  | Er  | Yb  |
| HS 88 5 1   | 2926   | 1692 | 399  | 1540 | 337               | 203 | 72  | 46  |
| HS 88 10 1  | 2320   | 1213 | 259  | 1040 | 203               | 135 | 48  | 35  |
| <b>Michard &amp; Albarede (1986): East Pacific Rise</b> |        |      |      |      |                   |     |     |     |
|   | Ce     | Nd   | Sm   | Eu   | Gd                | Dy  | Er  | Yb  |
| 13 N 14Ti <sub>2</sub>                                  | 13703  | 7765 | 2381 | 5265 | 1653              | 972 | 413 | 266 |
| 13 N 20Ti <sub>4</sub>                                  | 13989  | 7959 | 4084 | 5331 | 1717              | 997 | 395 | 289 |
| 13 N 20Ti <sub>4-D</sub>                                | 13774  | 7709 | 3964 | 5166 |                   |     |     |     |
| 13 N 15Ti <sub>2</sub>                                  | 2212   | 984  | 213  | 737  | 140               | 111 | 59  |     |
| 13 N 20Ti <sub>1</sub>                                  | 6959   | 3792 | 1264 | 2521 | 630               | 308 | 120 | 116 |
| 13 N Seawater   | 10     | 38   | 7    | 2    | 10                | 11  | 10  | 11  |
| 21 N SW 1149-2  | 3104.6 | 936  | 200  | 303  | 242               | 185 | 114 | 127 |
| 21 N SW 1157-2  | 1627.2 | 485  | 53   | 125  | 76                | 51  | 26  | 27  |
| 21 N HG 1160-2  | 11476  | 3397 | 891  | 1777 | 572               | 418 | 209 | 191 |
| 21 N OBS 1158-2   | 10135  | 1872 | 492  | 1270 | 509               | 332 | 179 | 191 |
| <b>Piepgras &amp; Wasserburg (1985)</b>                 |        |      |      |      |                   |     |     |     |
|   | Nd     | Sm   |      |      |                   |     |     |     |
| 1158-6a   | 528    | 100  |      |      |                   |     |     |     |
| 1158-6b   | 540    |      |      |      |                   |     |     |     |
| 1156-11   | 420    | 81   |      |      |                   |     |     |     |
| 1155-14a  | 2328   | 381  |      |      |                   |     |     |     |
| 1155-14b  | 2328   |      |      |      |                   |     |     |     |
| 1155-18a  | 4567   |      |      |      |                   |     |     |     |
| 1155-18b  | 4567   | 396  |      |      |                   |     |     |     |
| 1151-14a  | 1635   | 313  |      |      |                   |     |     |     |
| 1151-14b  |        |      |      |      |                   |     |     |     |
| 1154-6  | 970    | 170  |      |      |                   |     |     |     |
| 1160-11   | 1809   | 404  |      |      |                   |     |     |     |
| 1149-11   | 139    | 17   |      |      |                   |     |     |     |
| 1159-9  | 38     | 5    |      |      |                   |     |     |     |
| <b>Michard et al. (1983): East Pacific Rise</b>         |        |      |      |      |                   |     |     |     |
|   | Ce     | Nd   | Sm   | Eu   | (pmol / Kg)<br>Gd | Dy  | Er  | Yb  |
| 24G2  | 15630  | 7765 | 1191 | 3475 | 954               | 542 |     | 156 |
| 22G2  | 22125  | 7696 | 1177 | 2553 | 865               | 443 | 161 | 150 |
| 24G0  | 1142   | 569  | 126  | 118  | 32                | 18  | 15  | 10  |
| 26G2  | 14131  | 7037 | 1363 | 2599 | 1030              | 720 | 293 | 283 |
| 28G0  | 6380   | 3959 | 791  | 2488 | 725               | 431 | 167 | 110 |
| 28G0-L  | 7144   | 3993 | 785  | 2442 | 655               | 449 | 167 | 116 |

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| <b>Mitra et. al. (1994): Mid-Atlantic Ridge</b> |      |       |      |      |      |      |       |      |      |      |
|---|------|-------|------|------|------|------|-------|------|------|------|
|   | La   | Ce    | Nd   | Sm   | Eu   | Gd   | Dy    | Er   | Yb   | Lu   |
| <b>Snakepit (23 N)</b>                          |      |       |      |      |      |      |       |      |      |      |
| 1683-14 (1986)                                  | 2670 | 6900  | 2760 | 432  | 2500 | 437  | 250   | 67.0 | 33.5 |      |
| 1683-5 (1986)                                   | 1760 | 3710  | 1970 | 422  | 2110 | 362  | 230   | 65.6 | 37.5 | 3.96 |
| 1683-7 (1986)                                   | 2230 | 3740  | 1980 | 425  | 2120 | 397  | 241   | 73.0 | 43.0 |      |
| 2194-1 (1990)                                   | 1410 | 3140  | 2080 | 556  | 2960 | 440  | 286   | 70.6 | 39.4 | 3.90 |
| 2192-6 (1990)                                   | 1380 | 2970  | 1880 | 480  | 2850 | 402  | 240   | 63.3 | 31.7 | 3.12 |
| <b>TAG (26 N)</b>                               |      |       |      |      |      |      |       |      |      |      |
| <i>Black Smokers</i>                            |      |       |      |      |      |      |       |      |      |      |
| 2186-3 (1990)                                   | 4240 | 10200 | 6740 | 1400 | 3690 | 1240 | 878   | 336  | 249  | 30.6 |
| 2179-5 (1990)                                   | 4610 | 9960  | 6990 | 1450 | 3470 | 1330 | 907   | 325  | 229  | 25.8 |
| 2179-9 (1990)                                   | 4130 | 9070  | 5250 | 1040 | 3390 | 895  | 635   | 253  | 169  | 21.4 |
| 2191-5 (1990)                                   | 3710 | 8820  | 5570 | 1160 | 3610 | 938  | 685   | 281  | 196  | 22.4 |
| 2191-7 (1990)                                   | 3760 | 9020  | 5550 | 1170 | 3680 | 988  | 691   | 282  | 196  | 26.0 |
| <i>White Smokers</i>                            |      |       |      |      |      |      |       |      |      |      |
| 2187-1 (1990)                                   | 2570 | 3460  | 1370 | 235  | 9540 | 159  | 96.4  | 43.7 | 35.5 | 3.59 |
| 2187-3 (1990)                                   | 2650 | 3410  | 1370 | 214  | 9850 | 142  | 98.1  | 41.5 | 38.1 | 3.81 |
| 2187-6 (1990)                                   | 2750 | 4170  | 2080 | 305  | 8740 | 229  | 176.0 | 75.3 | 58.6 | 7.52 |
| 2191-1 (1990)                                   | 1820 | 2640  | 1120 | 198  | 6640 | 123  | 71.3  | 29.8 | 22.7 | 3.56 |
| <b>Seawater</b>                                 |      |       |      |      |      |      |       |      |      |      |
| S-pit (3400m)                                   | 31.8 | 2.70  | 21.9 | 4.20 | 1.08 | 5.74 | 6.34  | 5.50 | 5.34 | 0.87 |
| TAG (3300m)                                     | 29.0 | 5.44  | 21.4 | 4.13 | 1.06 | 6.25 | 6.36  | 5.47 | 5.42 | 0.88 |
| TAG (3500m)                                     | 36.0 | 6.62  | 25.5 | 5.12 | 1.32 | 7.13 | 8.04  | 7.15 | 7.17 | 1.18 |

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| <b>16. Abstract (Limit: 200 words)</b><br><br>This technical report serves as an appendix to a recent article by Byrne and Sholkovitz (1996) in the Handbook on the Physics and Chemistry of Rare Earths (vol. 23, chapter 158, pg. 497-592) edited by K.A. Gschneidner Jr. and L. Eyring and published by Elsevier Science. This article, Marine Chemistry and Geochemistry of the Lanthanides, discusses the physical chemistry of the lanthanides in natural waters, describes the major features of the lanthanides in rivers, estuaries and oceans and discusses the chemical and biogeochemical processes controlling the speciation and distribution of the lanthanides in the ocean.<br><br>The article by Byrne and Sholkovitz (1996) refers to a large set of published and unpublished data on the rare earth (RE) composition of rivers, estuaries, seawater, marine pore waters and marine hydrothermal waters. In order to conserve space in the Handbook article, a compilation of concentration data for natural waters will be presented in this report. Publications through 1995 are cited. |                                    |  |  |
| <b>17. Document Analysis</b>   |                                    |  |  |
| <b>a. Descriptors</b><br>rare earth elements<br>natural waters<br>oceanic composition  |                                    |  |  |
| <b>b. Identifiers/Open-Ended Terms</b>   |                                    |  |  |
| <b>c. COSATI Field/Group</b>   |                                    |  |  |
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